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Benchmarking Design: Multiplying the Impact of Technical Assistance to MSMEs in Design and Product Development.

Federico Del Giorgio Solfa.

LEADING INNOVATION THROUGH DESIGN

Proceedings of the DMI
2012 INTERNATIONAL RESEARCH CONFERENCE
AUGUST 8-9 2012 - BOSTON, MA. USA

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Leading Innovation through Design

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FACT SHEET

The Design Management Institute is a non-profit educational organization, class 501(C)3

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Everything ever made by human beings first requires **Design**, and in our world today of commercial business, this in fact requires **Management**. Discovering, defining, measuring, and communicating this fascinating accomplishment is precisely the mission of the Design Management **Institute**.

Board of Directors

Founded in 1975, DMI is the world's leading professional organization dedicated to design management. Everything designed, be it a product, identity, interface, environment, or communication, has to be managed. Integrating the creative side (intuitive, visual thinking, designing) with the analytical side (deductive, measurable, business management) is not easy. Design management is the art and science of empowering design to enhance collaboration and synergy between "design" and "business" to improve design effectiveness.

Today, DMI is an international authority on design management with members in 49 countries. The Institute conducts research, publishes a quarterly magazine, produces teaching cases with the Harvard Business School, provides career advancement workshops, and produces professional and academic conferences.

DMI Vision:

To improve organizations worldwide through the effective integration and management of design and design principles for economic, social and environmental benefit.

DMI Mission:

To be the international authority, resource and advocate on design management.

DMI Objectives:

- Sponsor, conduct and promote research.
- Collect, organize and make accessible a design management body of knowledge.
- Educate and foster interaction among design managers, organizational executives and managers, educators, and public policy makers.
- Be a public advocate for the economic and cultural (societal) importance of design.
- Assist design managers to become leaders in their profession.

Audience:

DMI serves those responsible for, interested in, and learning about the management of design, including CEOs, business and design executives and managers, designers, creative directors, marketing directors, brand managers, educators, and students.

Focus of Content:

DMI's research, conferences, seminars, webinars, and publishing focus on managing design for business success. Topics include design, innovation, design strategy, brand design, design measurements, corporate creativity, and design as management and as leadership.

2012 Programs:

- 20 seminar sessions covering 11 design management topics.
- Four conferences in Helsinki, Portland, OR, Boston, and New York City.

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Innovations in Design Research Methodologies, Management Processes, and Outcomes

Bridging Research and Practice in the Management of Design

Design-Led Innovation in Business Models

Developing Design Thinking Skills

Design-Led Innovation in Products and Services

Design-Led Innovation in Organizations and the Workplace

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FOREWORD

The 18th academic conference hosted by the Design Management Institute (DMI) of Boston, Mass., attracted a greater number of papers than any previous conference. The event was intended to highlight the importance of the contribution of design to organisational effectiveness and success, particularly in the ways that it can improve the new product development process, contribute to better strategic thinking and decision-making, and be an important element in the leader's toolkit. The conference was a means for researchers and thinkers to celebrate the importance of design and to work towards becoming a credible and full participant in the work of organisations.

We were proud and deeply honoured to have Professor Roger Martin, Dean of the Rotman School of Business at the University of Toronto, as our keynote speaker. He has been an inspirational thinker and one of the foremost and most passionate advocates of the methodologies and thinking of design as important and under-utilised organisational resources.

Our goal was to create an inclusive conversation among academics from a variety of disciplines, including business (organizational behavior, strategy, marketing, and operations) and design management (design strategy, product design, brand identity, communications, interactive design, user experience, architecture, and environmental design). We aimed to advance the state of the art in design management research, theory, and practice, and produce a significant contribution to this exciting and fast-developing field.

Businesses are changing; manufacturers are becoming service providers and services are focusing increasingly on experiences. Organizations, in both the profit and the social sector, are seeking competitive advantage through innovation in their offerings, structure, processes, and business models. We believe that this was an appropriate time to convene a gathering of academics to take a critical look at how to bring a scholarly lens to the ways that design may help to both shape and implement innovation in these emerging developments.

The theme of the conference, "Leading Innovation through Design," clearly attracted management theorists as well as well as design theorists, as it was intended to do. The conference organisers, in locating it close both physically and in terms of time alongside the management community's main academic conference – the AOM – hoped to attract 'mainstream' management researchers to contribute to the design management research conversation. The organisers believe that design management research has been undeservedly neglected by management theorists. The result was a large number of submissions of top quality, interesting, and rigorous papers. A total of 195 submissions were received from 36 countries and 133 universities and research institutes. These submissions were blind reviewed. Approximately 45% were accepted for presentation of full papers at the conference, and are published in these proceedings.

The conference was organised around these seven themes, and both full paper presentations and poster sessions were organised into these tracks:

- Innovations in Design Research Methodologies, Management Processes
- Bridging Research and Practice in the Management of Design
- Design-Led Innovation in Business Models
- Developing Design Thinking Skills
- Design-Led Innovation in Products and Services
- Design-Led Innovation in Organizations and the Workplace
- Innovations in Design Management Education

We would like to thank a number of people and organisations who have been helpful in organising the conference and preparing this set of proceedings. These include John Tobin, VP, Business Operations, from Design Management Institute who provided exceptional support in his role as Conference Secretary. We would like to thank Esther Dudley from Plymouth University, who encourage her students to produce artwork proposals for the conference identity, Sarah Essex whose design proposals were adopted, and every member of the International Scientific Review Committee who provided their time and expertise during the review process.

This was a truly international team effort by conference committee whose members were dispersed across the world.

Conference Co-Chairs

Erik Bohemia

Jeanne Liedtka

Alison Rieple

PAPER SUMMARIES: INNOVATIONS IN DESIGN RESEARCH METHODOLOGIES, MANAGEMENT PROCESSES, AND OUTCOMES

Hwang and Baek discuss the development of a mapping tool for analysing customers' emotional responses towards a retail environment. The tool is derived from emotional design theory and tested it in a large UK supermarket. In a retail environment, design elements should represent the brand vision that the company wants to communicate to its customers. Understanding how design elements influence customers' emotions is vital. However, such information is difficult to gather and analyse, since it requires decoding layers of emotional responses from customers The findings suggest that the tool helps designers to understand the emotional feelings customers experience in such a retail environment.

Chung presents a design process that aims to maximize user values, which extends from 'material and physical values' to 'immaterial and soft values' related to emotional and psychological values. User values can be divided into 3 groups: functional values, emotional/affective values, and psychological values

Xi propose a multidisciplinary evaluation method for demountable buildings that addresses the issues of environment, social responsibility and economic effects. The hypothesis is that the existing evaluation methods from related areas can be adapted and applied to small-scale public demountable buildings. A specific evaluation method that applies to public demountable buildings can then potentially be adapted to other types and scales in future research.

Mueller and Thoring analyze two different strategies that create innovative design or business concepts based on a user-centered approach: design thinking and lean startup. They compare process models for lean startup and design thinking and highlights the differences and similarities, based on a structured literature review. As a result specific modifications of both strategies are suggested.

Sundar and Kardes explore the role that pooled attractiveness of a design can play on preference when products are presented with standard or advanced features. Three experiments demonstrate that product design and descriptions contribute to consumer preferences. Consumers use design cues to estimate the product's perceived quality, which further influences preferences. Consumers use the presented information on features to make inferences. We see that when consumers are asked to conform, they prefer less attractive products paired with standard features or more attractive products paired with advance features.

Follett and Marra propose a model for improving knowledge exchange in order to meet the complex demands of industrial R & D in Scotland. As the UK government and public policy bodies seek routes back to economic growth, the domestic higher education sector has been identified as a source for innovation. The Scottish economy's particular weaknesses in industrial R&D mean that resultant knowledge exchange is critical..

Ma suggests that he popularity of social networks and Internet forums has provided consumers with a new way to submit complaints, which prompts companies and designers to think about what is really good quality. The paper starts with a review of *perceived quality* and then takes as a case study male users' *brand perceived quality* in the home cleaning industry of China.

Bowie says that despite design and branding having taken on a new importance in business in recent years, logo design has been studied less often. His paper addresses the topic using a quantitative approach to call into question the traditional belief that logos serve only to differentiate. It is asserted that another critical function of logos is to provide legitimacy by conforming to design norms within industries. Similarity of logos within industries is examined using analysis of trademark registration data from the United States Patent and Trademark Office. Logos of Apple Computer and Lucent Technologies are discussed as examples of ineffective and effective innovative, or "deviant," logos. Further analysis of USPTO data addresses the question of whether innovation or conformity is a better strategy in adopting a logo design.

Alkaya, Sleeswijk Visser and De Lille suggest that gathering and analyzing user data can be a strong driver for innovation in companies. Their paper presents a tool, based on theory of empathy in design, developed for the NPD team of a large company in the retail sector to collect and combine diverse user data and use this for inspiration for new product ideas given that user data is not always shared across departments and/or is not presented in a way that is useful for NPD teams.

Del Giorgio Solfa reports on an exploratory study of the importance, scope and dimensions of the benchmarking of product design for Buenos Aires commission for micro, small and medium producers. The study evaluates the policies and actions to support micro, small and medium industries and how benchmarking design can contribute-in a system of institutional support for design.

Lam, Wang and Shams demand for smart home concepts targeting older adults have grown in response to the ageing population. However, developers have been struggling to turn concepts into reality due to the lack of understanding of older adults. This paper develops a user-oriented design research tool as a mean to sensitize developers to older adults' needs and create user empathy. The new tool combined the richness of Cultural Probes with a rigorous coding process.

Töre Yargin and **Erbuğ** suggest that user research has benefits for the design process including its contribution to innovation. It is important that the delivery should be done effectively This paper aims to discuss the requirements for user research delivery that aids in innovative design processes on the basis of an information system that is designed for communicating the findings of user research in automotive design.

Leigh, **Huber** and **Tremblay** suggest that the creative expertise needed to compete in the global economy may be a scarce commodity. Problem solving is a cluster of factual knowledge, skills, experiences, attitudes, and value judgements, has been used to determine expertise and as an attribute of the design process, offers opportunity to examine early development of creative expertise. This study examines design students' problem solving processes, using findings to generate the Creativity Rating Scale (CRS), a tool for assessing creative potential.

King, **Parmar** and **Liedtka** discuss the various components of the design thinking process and the "designer's mind." They suggest that research on the innovation process suggests that the mindset through which an individual frames a problem plays an important role in determining the kind of choices he or she makes. In this paper, they look across the fields of managerial cognition and psychology to examine various approaches to describing and measuring mind-set, hypothesize how these contribute to or inhibit design thinking practices, and report on a small initial trial of several instruments. They conclude with outline methodological challenges and opportunities that confront researchers in this area of design.

PAPER SUMMARIES: BRIDGING RESEARCH AND PRACTICE IN THE MANAGEMENT OF DESIGN

Whicher, Cawood, and Walters say that according to a European Commission public consultation, the greatest barrier to the better use of design in Europe is the lack of understanding among policy-makers; academics have provided evidence of the impact of design on economic performance; yet design, unlike innovation, is not well integrated into policy. Their paper develops a framework to benchmark policies for design in Denmark, Estonia, Finland and the UK and compare what data should be collected against data that is currently available. Their research seeks to further develop the emergent field of research in design policy and provide practical policy insight.

Van den Broek's theoretical paper aims to discover the characteristics of design firms that influence their strategy development. By relating the literature of strategy to the creative industries and the design sector in particular, a conceptual model of strategy development that incorporates the idiosyncrasies of the design sector is constructed. These idiosyncrasies include: the size of the firm, creativity as main source of value creation, the orientation of the owner-manager and dependency on strategic networks. These characteristics command a distinctive strategy development model that is not directly transferable from the mainstream strategy theories.

Thomas and Marsden discuss the role of organizational symbols. These are a reflection of organizational strategy, and therefore are designed with the intention of communicating some aspect of a given corporation. However, although it has previously been noted that symmetry is prevalent in abstract corporate symbols—particularly in the financial sector—there has been little systematic investigation into the communicative potential of symmetries within the context of organizational symbols. This paper presents the findings of a survey of the top 100 financial brands and discusses the frequency of symmetry within these symbols. A subsequent exploration of the association between brand values and the perception of symmetry within these brand marks is discussed along with recommendations for further study.

Marsden and Thomas suggest that while the academic discussion on corporate brand identity has increased over the past 20 years, relatively little attention has been directed towards the theoretical development of corporate logos. Following a brief survey of literature, a conceptual framework for capturing the various visual expressions is proposed. Following an explication of the constructs, the application of the framework—through secondary research and archival data—is described and its effectiveness is reviewed.

Matteoni and Almeida provide a historical overview of design culture, the concepts of communication, and the concept of "author function" to discuss the places of authorship in the design process. They focus on the symbolic meaning which all designed products have and which may change depending on the social niches that they are communicated to.

Leigh, Huber and Tremblay say that creativity remains an elusive, intangible contributor to organizational performance. Yet few empirical studies have investigated this, or have differentiated creative versus non-creative domains. The authors also suggest that organizations have yet to establish management frameworks for maximizing their creative capital. Their study surveyed staff from the five top ranked U.S. architectural practices (N = 90). The findings identify potential differences between creative versus non-creative domains, factors impacting creativity in the workplace, and the relationship between organizational creativity and annual revenues. Based on these findings, the authors developed a Firm Creativity Profile (FCP) that summarises the creativity factors that may help to improve organizational performance.

Hesselmann, **Walters, and Kootstra** present a critical investigation of the Design Management Staircase model used to assess current design management practices and capabilities of European businesses. The model is applied to four different datasets for each year from 2008-2011. It explores the development of the trends in the Staircase model scores. Further analyses

are conducted examining differences in Staircase scores of businesses that recognize design and design management as an important tool for innovation.

Hertenstein, **Platt and Veryzer** argue that definitions of what “good design” is are not readily found. They suggest that “good design” is necessarily amorphous since it may be relative to a particular context, as well as constraints imposed by markets, consumer tastes, technology, and design and business objectives. This article explores the question “What is ‘Good Design’?” by relating the findings from a research study conducted with industrial design managers. This study yielded insights into the nature and possible ‘structure’ of “good design.” In addition to providing a way to be more explicit and precise about “good design,” this research provides a foundation for further work in areas such as: scale development, product branding, and other practical tools and insights for design management and research.

Mars and Minvielle claim that little attention has been paid to the contribution of design to the development of a pertinent brand experience. Their paper examines the potentially cohesive role of design in creating a distinctive brand experience, and is an attempt to reveal the managerial conditions that could enhance collaboration between designers and brand managers. Their exploratory approach relies on in-depth interviews of 45 design managers, conducted in a French context. The results underline, for the firms being studied, 1) a greater understanding of the crucial role of design for both innovation and the creation of the brand concept, 2) a lessened awareness of its benefits for the tactical & operational management of the brand experience, and 3) various practices of Brand Design Management among different industries.

Calabretta, Gemser, Wijnbreg, and Hekkert suggest that limited consideration has been given to the strategic role of design consultancies in the innovation processes of their clients. One explanation is the difficulty in assessing the quality of design consultancies’ output, given the intangibility of the output itself and the difficulty of connecting a knowledge-intensive output to clients’ performance indicators. In this paper the authors examine design consultancies’ impact on their clients’ strategic decision-making. Design consultancies can influence strategic decisions in three ways – through rationality, intuition, and political behaviour. By examining the Dutch design consultancy industry, the authors find evidence of design consultancies’ ability to affect their clients’ strategic decision-making. Early involvement in problem definition, and long term relationships with clients, strengthen design consultancies’ influence.

Heskett and Liu focus on design in China, which is frequently criticized for being underdeveloped and lacking connection with industries, yet more and more Chinese brands are becoming known worldwide. Many of them utilize design as an important tool to obtain business success and build brands. However, their modes of practice have seldom been studied. In this study, six criteria for evaluating design management practice in Chinese enterprises are identified through use of a large-scale questionnaire. Based on in-depth interviews and case studies, six models of managing design are identified, which not only implies steps for establishing and developing design capacity in Chinese enterprises, but also represents an approach to design-led innovation.

PAPER SUMMARIES: DESIGN-LED INNOVATION IN BUSINESS MODELS

Ceccato and Ribas Gomez' study brings together design management and branding with neuroscience theory. Their paper describes how the consumer's brain responds to the visual perception of a brand's graphic signature. Design management plays a central role in branding, communicating the brand's deepest values through elements perceived by the human senses, such as the graphic signature. Understanding the responses generated by the visual perception of such elements is important. The authors describe the emotional and rational brains, to differentiate the reactive and analytical cerebral responses that originate from a consumer's visual perception of a brand's graphic signature. These can trigger an automatic preconscious response that, if positive, can assume the form of preference, and result in an impulsive buying decision.

Buur and Gudiksen suggest that, rather than proposing 'design thinking' as an abstract approach, design materials as used routinely in the design profession, when introduced in a business context can engage a cross-disciplinary circle of stakeholders and challenge them to reconsider their business assumptions. The authors show how 'tangible business models' – for example in the form of pinball-like contraptions – encourage participants to play with hypotheses and experiment with scenarios as a way of innovating business models. In a sense this is 'design thinking' with hands and body.

Bucolo and Wrigley argue that although prototyping is an established and accepted practice with a valuable role during the design process, the concept of a business model prototype, however, is not well understood by either the design or the business communities. This paper is conceptual and presents a process for creating and enabling business model prototypes. Specifically, the focus is on building emotional connections across the value chain to enable internal growth within firms. To do this, the authors' have relied on personal observations and critical reflection from multiple industry engagements. The outcomes of this critical reflective practice are presented and the opportunities and challenges for this approach are discussed.

Bason. Focusing on a public sector context, this paper explores whether there are particular patterns in the changes that flow from design-led approaches to innovation. The author questions whether, as public managers utilise design processes in their quest to re-think policies, services and organizations, new business models for public service provision arise. The paper shows how design processes can lead to more co-productive business models for public services, which build systematically on the skills, motivation and resources of end-users and other key stakeholders. It is argued that design-led innovation may help public sector organizations achieve better outcomes at less cost, but that it will require significant changes to the inner workings of government.

Simonse, Vis, Griffioen, Nino, Ruiz, Crossley, Urrego and Soto Camacho explore the concept of business model design, and conclude that the modeling aspect is often missing from this process. The authors undertook five experiments in eHealth business model design and built upon their capabilities to create new business models in a designerly way. They suggest that if the question of eHealth is framed in a social context of actors and transactions, new opportunities for designing a business model emerge. With these five cases, they open up the 'black box' of the design process and look at what is actually designed.

Kang, Chung, and Nam believe that it is time to investigate whether design thinking, despite its popularity, is reflected in business schools' practice. The authors examined the curricula from top ranked EMBA programmes from three Regions, in addition to a further four EMBA programs and three examples of non-degree executive education which actively integrate design as a subject. Three models of design integration in executive education are identified.

Gudiksen claims that companies can no longer rely only on analytical tool such as planning, but need to move to the more creative act of modelling. This provides a gateway for design thinking and making. Through two participatory design workshops and four business cases this paper investigates how different design processes, activities and learning styles can improve dialogues

on business model development and get participants to work with ‘future state’ alternatives. It presents some principles in relation to design processes and through video analysis shows how different design activities support reframing and broadening of the initial problem statement.

Gilbert, Smith, Sutherland, and Williams’ paper presents a case study of a design led approach in driving product/service innovation in a conservative professional services company. Through design thinking, Deloitte Digital has re-orientated its business model from a ‘straight to solution’ approach to one that focuses on delivering an ‘And Different’ customer experience. Whilst still in its early days, it is clear design thinking has become an effective means in democratizing innovation, and is a key catalyst in linking strategy to action.

Fain, Kovacevic, and Fairbairn’s paper reports on a joint industry-academia project, aiming at integrating functions involved in new product development (NPD) for a faster and more effective commercialization of innovation. The project is currently in the testing stage, so the authors are reporting on the analysis and model proposal stages of it. The major purpose of this paper is to emphasise how theory can be translated into practice and what challenges arise from such processes.

Di Lucchio suggests that there is a need to redefine the relationship between the different stakeholders in the supply-chain from producers, to designers, to consumers. Because of globalization, there is an increasing gap between those able to access to the global system and those who remain marginal. The author asks if it is possible to imagine a different geography, and could design have a role in this? The project reported in this paper is an experimental study (that is, action research) which investigates, analyses and tests a different model of relationship between the players of the design-production-consumption process.

Cruz Megchun claims that there is scant empirical research on management of design in developing countries. This paper focuses on the use of design management within small Mexican TBEs in new technological industries. It used intervention experiments in three longitudinal case studies to analyze the management of design during the development of technological innovations. Findings suggest that design management can assist entrepreneurs to become aware about their condition; to make-decisions in risky and uncertain environments; to deploy tangible and intangible resources; to trigger innovative thinking and transform knowledge; and to assimilate information and manage cycles of innovation.

Cautela, Pisano, Pironti, and Rieple in their paper suggest that 3-D printing technology is a form of disruptive innovation that is transforming the design and prototyping service sectors. The key feature of this technology, that it allows firms to produce small quantities of customized goods at relatively low costs, is affecting incumbent companies making it possible for “business to consumer” production to replace the existing “business to business” manufacturing business models. B2C activities can be undertaken by new small firms with few technological capabilities. The technology is also accelerating the creation of new design ventures that can leverage crowd-sourcing and external creative sources to create different product typologies. A number of qualitative case studies describing the business model “building-blocks” of these companies are described in this paper. The paper presents a number of propositions concerning the business models of prototyping companies and design new ventures.

PAPER SUMMARIES: DEVELOPING DESIGN THINKING SKILLS

Cruickshank, Whitham, and Morris's paper describes their research involving over 200 companies, ranging from micro businesses up to large multinationals, such as the BBC, Arup, and IBM, and its application to the design of knowledge exchange (KE). They conceptualize KE process design as a form of interaction design and go on to propose a new 'second order' approach to KE design, enabling others to design their own KE approaches based on a framework of tools and methods. This is explored through the idea of a KE design toolkit that provides resources and support for designing KE processes and that requires users of the toolkit to engage with the KE problems they are trying to solve. This has implications for company innovation and the role of design and design thinking in innovation processes, particularly in the areas of open design and innovation.

Lee suggests that design and design thinking are part of a third culture separate from those of the sciences and humanities. This paper repositions design thinking within key philosophical and educational paradigms, and illustrates how design thinking as a method, process and approach can be taught. This is achieved through a focus on project based learning, innovation, a redefinition of technology and the integration of participatory action research objectives and participant observation methodologies.

Zupan and Svetina Nabergoj discuss the merits of the design thinking methodology as a new method of teaching entrepreneurship. As recent studies indicate that teaching entrepreneurship is often ineffective, discussions about new methods have emerged, such as design thinking, a problem-based methodology. They discuss the implementation of design thinking in an undergraduate entrepreneurship class at the University of Ljubljana, using a series of exercises as a means of developing skills and mindsets.

Wright, **Wrigley**, and **Bucolo's** paper presents an emerging research agenda that applies design led innovation approaches from the business sector to the secondary education curriculum. A review of design education literature is undertaken and a regional secondary school design immersion program outlined as the site for a future case study using action research methodology.

Stevens' paper reports on an ongoing investigation into one aspect of the design thinking phenomenon, namely the use of designed artifacts — sketches, renderings, graphics, models and prototypes — as symbolic objects in strategy making and implementation. It examines the conceptual overlap between design and the strategic cognition perspective, which considers cognitive processes and structures involved in strategic decision making, particularly the phenomenon of sensemaking. It is primarily a theoretical exploration, but draws on two short testimonies from designers. The specific conceptual connection between design practice and strategic cognition theory is potentially valuable to business leaders and managers involved with innovation, design management and strategic decisions. Preliminary findings suggest sensemaking activities by designers generate innovative future concepts with far-reaching strategic implications; designed artifacts aid sensemaking and sensegiving by management in exploring new business opportunities and directions.

Schneider and Moser seek to unravel what they say is the design thinking myth. Although the hype purposefully built around design thinking has been beneficial in bringing about the shift from design as a tactical towards a strategic catalyst of innovation, the authors argue that design thinking needs repositioning away from thinking of it as a simple creative toolbox. Through the analysis of a two-week design thinking workshop with 15 cross-disciplinary participants - design novices with no previous experience in applying design thinking - the authors reveal the three-layered impact of an action-based teaching format to generate understanding, ownership and incubation of the design thinking ethos. In conclusion, this paper postulates a concrete role, practice, applicability and teachability of the next generation of design thinking, based on action, indirect knowledge diffusion and context-dependency.

Thoring and Mueller argue that role-playing is a means of concept representation that is often used in design thinking or service design, but relatively unknown in general management or business innovation. Originated in theatre, this technique can be used to prototype complex socio-technical systems, in order to evoke certain experiences in users, designers, or developers, as well as to gather feedback about a certain concept for iteration purposes. Their paper presents a structured literature review about the use of role-plays in different fields, which results in a detailed framework of different types and characteristics of role-plays.

Lascar and Barrera suggest that in Latin American countries where there is little industry, but which focus instead on cultural production; it is hard to generate innovation that will lead to market competitiveness. Given the emotional and cultural weight of these products, the authors argue that a redefinition of design practice needs to take place that incorporates the importance of cultural values and the transcendence they may have for users. This article proposes rethinking the design foundations by which cultural products are built, redirecting it to the notion of “going-back to the origins” in an attempt to revitalize traditions, interiorize cultural values and understand the cultural nature to rescue what might be distorted or lost.

Jervis argues that the terms design, design , and digital design literacy are increasingly associated with non-design disciplines as technologically enabled globalised collaboration dissolves boundaries. This paper presents a literature survey of contemporary design theories leading to the definition of an international design thinking index. The index is proposed as a connecting and inclusive language of design to aid global collaboration as the information age transitions toward a creative molecular economy.

De Lille, Roscam Abbing, and Kleinsmann argue that design is not just for products, logos or websites. Instead companies are embracing design as a way of enabling their organizations to adapt to changes in society. One of the challenges organizations face is how to create value for their customers by delivering experiences. For example, product-service systems need to be designed, using a ‘designerly’ approach. The authors ask what is the role of design consultants in embedding this designerly approach in organizations, and what role does design thinking play in this? This article is built upon a series of interviews with different consultants, to arrive at suggestions for professionals that wish to shift from a traditional product-centered approach towards delivering product-service systems.

PAPER SUMMARIES: DESIGN-LED INNOVATION IN PRODUCTS AND SERVICES

Sun and Almeida explore how ‘design’ is related to 'experience’ in event industries. They argue that there is little research demonstrating the value of experience design within events. There is also a lack of information on current practice within the event industry. In their study, five event agencies in Portugal were sampled with in-depth interviews used to collect data. This study concludes that design is undervalued and unexplored and the concept of experience as an offer or even as a design discipline is almost completely disregarded from agency discourses. Based on their findings, the authors have developed a conceptual framework on the event experience cycle which proposes a new way of exploring the connection between the experience cycle and design process.

Sharma examines the efficacy of design as a tool for empowerment, especially to achieve millennium goals that will benefit the poorer sections of society. His paper identifies the critical components of design thinking and how it can be applied to emerging economies. The paper makes a case for using Design Thinking as a tool for empowerment of the poor, who currently do not fall into a market segment, a user group or a “VOC” data set. The paper demonstrates how design thinking incorporates invention with emotion, innovation with empathy and consumption with passion for environment as well respect for all the stakeholders.

Noppeney, Endrissat and Lzicar examine an innovative and design-based product development process in artistic perfumery reporting on a design agency that has developed an alternative, design-based, approach to developing perfumes. What turns out to be driving this process is a strong sense for aesthetic consistency, a passion for authenticity, and an unusual presence of an emotional dimension throughout the process.

da Motta Filho argues that customer experience has now become a central arena for competition in services, not only because of the need to develop memorable customer experience, but also to infuse these with brand associations. The literature and practice suggest that current brand manuals do not address properly the needs of NSD teams working with service experiences. This paper reviews the status of current brand manuals proposes the concept of a brand experience manual as a way to bridge the gap between brand strategy and the NSD teams, and proposes a new model of a brand manual.

Lee and Evans suggest that design is not limited to being an operational tool developing tangible outcomes, but recently has expanded to a more strategic role. Corporations’ acknowledgement of design has shifted from product development toward cultural transformation and increasingly design-led. However, there has been little research to investigate how to embed design as a cultural entity within the different industries. This paper proposes a framework to assist the FMCG industry in enhancing the role of design within brand development and thereby assist FMCG organisations to attain a design-led culture.

Chang, Joo and Kim seek to achieve a rich understanding of the concept of design thinking and apply it to real world cases. They review the literature concerned with design thinking and develop this into a conceptual framework. This framework is then mapped to the team-level innovation matrix to identify how corporations may reach high-level design thinking in the innovation process. Their research suggests that corporations innovate through different paths; Apple took a *Technology Epiphany* path while Samsung took a *Technology Push* path.

Kim, Lockwood, and Chung’s paper discussed the increasing impact of digital marketing activities on business success. This has meant that digital design agencies have broadened their expertise or service areas to include the development of digital marketing strategies across multi-platforms. Their research classifies the roles of US-based digital design agencies, as well as uncovering the skills and tools utilized in undertaking those roles. They undertook a content analysis of 366 job descriptions from 21 award-winning agencies and also undertook deeper case studies of two

agencies. Five types of functional actions, skills, and tools (production, strategy, copywriting, design, and technology) were identified, and the work of each function described.

Hansen-Hansen. In this paper design-led innovation is theorized. A diverse range of design types and strategies used in the luxury fashion business is evaluated through the prism of entrepreneurship as defined within the tradition of the Austrian School of Economics. It is argued that luxury fashion business serves as a prime example of different design-led innovation methods; and further that these can be integrated into a specific conceptualisation of Design Management.

Ford and Woudhuysen's paper focuses on the dynamics of knowledge acquisition during the 'fuzzy front end' of product design projects. They suggest that, through a novel management process and through integrating different players in new product development, higher education institutions can help small firms, in particular, get existing knowledge transferred to them. The result is the development of new knowledge, lower uncertainty through prototypes, and the ability to make the most of design within their firms.

Cantu and Rizzo's paper reflects on the role of design in specific research projects where: (i) the field of intervention is a geographical area, with its resources and opportunities; (ii) the approach adopted is participatory, including potential stakeholders in the development of solutions; (iii) the funding comes from public institutions or private foundations, thus the owner of the solutions generated is not predefined. In this framework the ownership of the project emerges as a major issue after the funding finishes. Therefore a discussion on design strategies to manage the transition from a protected testing environment towards self-sustainable solutions implemented in the market is presented on the basis of a Life 2.0 project experience.

Alsibai says that knowledgeable food choices are increasingly difficult to make, despite access to information being readily available on social media and the Internet. This is because information is not available during in-store shopping environments such as supermarkets. This paper discusses in-store consumer product purchasing and food selection behaviors. The paper explores the roles of food and health, consumers' information search on purchasing decisions, as well as the role of mobile recommendation agents (MRAs). The paper concludes with a discussion of how design can play a role in improving consumer's in-store food shopping decisions.

Abecassis-Moedas and Pereira analyze the determinants behind the choice of contracting work to external designers when companies have internal design teams. The paper describes a multi-case study analysis of seven industrial firms (four plus three of the control group) that use design actively in their activity. The results reveal that companies that contract external designers have one of two goals: a) have a 'design breakthrough' perspective – radical innovation; or b) benefit from the association with a recognized designer. In those cases the internal design team is used to do incremental innovations in the product platforms developed by the external designers.

Yang, Nam, and Park argue that although the Product-Service System (PSS) perspective is becoming more important and there are not many studies on this topic from a design perspective. Their paper focuses on understanding the characteristics of PSS through design attributes, and identifying whether design attributes change as a result of this perspective. They also examine whether there is a beneficial effect of combining the product and service, as in the PSS methodology. To categorize the PSS, professional designers selected the design attributes from a number of case studies. Seven groups of design attributes were identified. These were positioned on a quadrant with two axes, 1) inter-dependency between product and service, and 2) users' involvement resulting in a typology of service behaviors; 1) Creator 2) Interaction between service provider 3) Receiver 4) participant.

PAPER SUMMARIES: DESIGN-LED INNOVATION IN ORGANIZATIONS AND THE WORKPLACE

Warwick, Young, and Lievesley describe work within early cycles of a doctoral programme of critical design action research. It synthesises themes in the transformational practice literature with themes emerging from primary research following a service development programme in a VCS organisation. This is presented as a tentative framework of design activities to affect transformational change in a VCS organisational context.

Terrey presents findings from research on how a large complex public sector organisation, the Australian Taxation Office, has adopted human-centred design. The thesis is that 'managing by design' comprises a collection of human and non-human actors that make up networks of action and interaction, which over a decade have permitted the embedding of design in the management practices of the Australian Taxation Office. The application of Actor Network Theory (ANT) is used to draw out the analysis of the process of translation of managing by design which results in a networked view of design in practice. This paper discusses the translation process and the critical strategies used to create and sustain managing by design as situated networks.

Grossman-Kahn and Rosensweig's paper discusses what happens when leaders who look to design-led innovation as a 'silver bullet' find their organizations frustrated when new initiatives do not immediately lead to groundbreaking results. This emphasis on swiftly transforming a culture through a single approach conflicts with the multidisciplinary nature of innovation and undermines the sustainability and growth potential of innovation efforts. There is a tension between creating nimble, innovation-driven cultures without disrupting the existing culture and practices that are unique to each company. The tension is magnified when companies attempt to adopt new innovation methodologies without a deep understanding of the underlying principles or a willingness to endure the unpredictability of the creative process.

Pozzey, **Wrigley,** and **Bucolo** describe insights found during an ongoing industry engagement with a family-owned manufacturing SME in Australia engaging in a design led approach to innovation. The initial findings are presented as a case study. Over the period of one year, the first author's immersion within the firm unpacked the cultural, strategic, product opportunities and challenges when adopting design led innovation. Findings show how a firm can more effectively assess their value proposition in the market and what factors of the business are imperative in stimulating competitive difference. Initial insights were found through qualitative interviews with internal employees including: overcoming silos; moving from reactive to proactive design; empowerment; vision for growth and the framing of innovation. The core insight identified from this paper is that design led innovation cannot be seen and treated as a discrete event, nor a series of steps or stages; rather the whole business model needs to be in focus to achieve holistic, sustainable innovation.

Parkinson and Bohemia argue that designers, above all, tell stories, whether this is in the production of artefacts such as sketches, renderings prototypes and multimedia presentations, or verbally when discussing their ideas with one another and their clients. They suggest that when designers work with an organisation at the conceptual stage of a project process, this storytelling can lead to certain impacts on the people in those organisations. In order to explore relationships between approaches to design storytelling and their impacts on employees of an organisation they developed the 'Design Storytelling Impact-Approach Framework'. Factors incorporated into this framework were identified from relevant bodies of literature and then explored within a case study of design teams in order to refine the framework

Na and Choi's paper describes a rationale for the creation of a corporate-level design policy which encourages design-led innovation. Although UK manufacturing has shifted towards advanced and high value manufacturing, there is concern for the future of UK manufacturing. To address this, the

UK government is encouraging innovative manufacturing development. However, the authors have found a general lack of design utilisation in UK manufacturing.

Minvielle and Thieulin suggest that although the academic community has addressed the role of many types of models and processes in innovation and product development, the impact of design practice on strategy has been rather ignored. Based on a qualitative study of 45 design managers, the authors analysed the role of prototyping in design, not in terms of innovation or product development, but in terms of strategy definition and management. Using the concept of "strategy as practice" as a research tool, the authors show that the way design managers use prototypes and intermediary objects can be a major contributor to company's strategy.

Miller and Moultrie suggest that design leadership has received increased attention recently, particularly in knowledge intensive organisations although little is known about the nature of individuals in design leadership roles. This study identifies the skill sets of design leaders in fashion retail. Interviews were conducted with 20 design leaders in seven UK-based international retailers. The results reveal distinct skills and patterns from those previously reported in design leadership and broader leadership literature. Predominantly, these relate to what they term 'designicity'. This research also helps to identify the need for formal design education in design leadership.

Matthews, Bucolo and Wrigley's study deepens our understanding of the challenges faced by design champions in proposing and applying design methods and insights in existing firms. They investigate the role of design champions as they incorporate design into operational and strategic conversations. Interviews with design champions were used to investigate their experiences and challenges.

Lockwood, Smith, and Mcara-Mcwilliam describe a design intervention project, 'Creating Cultures of Innovation', that works with Scottish businesses to explore how they may apply design approaches to transform in-house innovation capacity and solution generation. The paper is a case study of their work with a Scottish company in order to build *sustainable innovation*, where creativity is permanently embedded in flexible, multi-disciplinary teams. The case study furthers our understanding of how organisations build up resources for innovation and make effective use of established knowledge, insights and expertise.

Lindahl and Grundström's research focuses on how a design-centric logic affects the new product development process. The study focuses on the early stages of new product development, critical for successful product development and dependent on a successful interplay between design and other functional areas involved. The findings from a qualitative study of five new product development projects in two design-led organizations are presented.

Garud and Karunakaran suggest that many studies have chronicled how firms fall into cognitive traps and thereby fail to capitalize on emergent opportunities. Yet firms may be able to navigate such cognitive traps by harnessing projects as a basis for opportunity creation and ongoing organizational transformation. In this paper, the authors track a specific project at Google that led to new products, a new business model, and a programming technique, all of which led to new capabilities. Their analysis reveals three core processes that form the bases for an emergent "design approach", one that lies in contrast to the traditional "design school". They conclude with observations as to how the new design approach can help firms navigate cognitive traps.

Johansson and Woodilla's paper draws on data from a case study of six projects where artists used their artistic competence as organizational change facilitators. They argue for a theoretical coupling of the discourse(s) of design thinking to research streams within art-and-management. The artistic dimension of design, the practice perspective and the artistic process should be considered if the full potential of design thinking for companies is to be achieved. The authors suggest that the artistic side of design should be acknowledged more within the discourse of design thinking. Insisting that design thinking interventions are led by practicing designers or artists will reinvigorate interest in the concept rather than dismissing it as just another management fad, accused of being of no lasting value.

PAPER SUMMARIES: INNOVATIONS IN DESIGN MANAGEMENT EDUCATION

Norman and Jerrard describe new research which explores the impact of master's (graduate) level work-based learning on design managers and their practice. The roles of designers are explored together with the cultural gap often found between designers and non-designers. A review of learning styles and the nature of work-based learning provides a backdrop, which is further explored through the changing relationship between learning and higher education. Graduates of the Master's in Design Management at BIAD, Birmingham City University, were interviewed to determine the nature and impact of their work-based learning. The research found common learning and communication perceptions; important links between professional competence and experiential curricula, design thinking and innovation. Overall, the results indicate significant potential for development in university courses where work-based learning and shared curricula can possess great potency.

Meza argues that graduate programs able to develop the innovation that Mexican society requires are needed. He argues that the integration of diverse disciplines is a powerful way for improving the understanding of Mexican family business problems and generating design strategies that lead to innovation. This is necessary to support the development of complex thinking and design management transformation processes.

Imbesi suggests that industry is undergoing an historical shift in its role as a result of new technologies and the emergence of a service sector. The process of digitalization is leading to a transformation of the nature of the enterprises, while opening up new forms of micro-factories and "personal capitalism". The new generations of designers have come to terms with deindustrialization and, while their predecessors had a role in the assembly line with manufacturing processes, today's designers are increasingly aware of their strategic role concerning innovation. Production has assumed a completely new shape, with new outcomes. Thus the author asks 'What are the characteristics of post-industrial production that design education needs to address?'

Heidaripour and Sadeghi Naeini argue that most of the literature on design management is based on research in industrialized countries, and our understanding of the subject in other cultures is quite limited. Thus this paper aims to provide an in-depth understanding of design management in Iran. Using data from five interviews and further documents, two scenarios for solving the complex situation are proposed; enhancing the implementation of design management on the cultural pavement and the management of industrial design in Iran's education system.

Griffith and Griffith argue that students, due to their lack of commercial responsibility, are free to take risk in their course activities and are intrinsically motivated to experiment and push boundaries. This may be partially true, however, they believe that students are increasingly driven to perform to their academic best as their university, peers, potential employers and industry measure them on grades. As a result they like to maintain control over their performance and will avoid risk taking in research, projects, group selection and team participation despite risk taking to emulate practice and facilitate learning being promoted by educators. This paper discusses practices developed by the first author to determine student concerns about risk taking, remove perceived risks to performance and encourage collaborative innovation.

Wrigley and Bucolo suggest that traditionally, design has been centred within the manufacturing and production areas of companies and or as a styling afterthought. Increasingly, design is viewed as a strategic business resource. This paper challenges the values held by academics and industry regarding the traditional role of designers in business. It investigates the emerging transitional engineering framework and puts forward a proposal for the next generation designer in the future era of design. Questions surrounding how designers will develop these new skills and how the authors' new framework of design led innovation can contribute to the future of design will be presented.

Agarwal and Salunkhe's paper presents a case where the impact of including "design thinking" in management education was assessed. Design thinking inputs were systematically induced into the management curriculum. The learning outcomes of students undergoing these courses were examined to determine whether the approach created any significance difference in these students as compared with the students on a conventional management program. The results showed that inclusion of design thinking oriented subjects enhances creative and innovative thinking competencies in the students.

Bohemia proposes that designers should be introduced to and versed in a non-essentialist understanding of culture, as opposed to an understanding of culture as having essential qualities. The rationale for the importance for designers of a non-essentialist understanding of culture is twofold: Designers are designing with others and they design for others. When designing with others designers should to be skilled in intercultural communication which is informed by processes of 'representation', 'othering' and 'identity'. He uses an international project to examine communication practices of upcoming designers in relation to these three processes. He concludes that although the project provided studnets with an opportunity to experience working across cultures their intercultural communications generally exhibited essentialist approaches in regard to 'representation', 'othering' and 'identity'.

Zidulka and Glover suggest that the teaching of design thinking seems to require a "design context," including a studio space and partnerships with a wide range of collaborators. For business faculty whose classes are not situated within such a context, asking students to adopt design approaches may not be realistic, and creative problem solving (CPS) may present a more accessible approach to fostering creative capacity. CPS offers the advantage of being similar to standard analytical approaches to problem solving, allowing business students to build on their existing strengths as analytical thinkers, while developing creative capacity in an incremental way. As a generic model, CPS allows students to increase the level of creative risk, as they grow their skill and comfort level.

Innovations in Design Research Methodologies, Management Processes, and Outcomes

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SUPPORTING NPD TEAMS IN INNOVATION: STRUCTURING USER DATA ON THE FOUNDATIONS OF EMPATHY

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Gathering and analyzing user data in new product development (NPD), both qualitative and quantitative, can be a strong driver for innovation in companies. While ideally user data should be obtained through direct interactions between NPD teams and targeted users, time and cost restrictions often make this impossible within organisations. Moreover, in larger companies, user data is not always shared across departments and/or is not presented in a way that is useful for NPD teams. This paper presents a tool specially developed for the NPD team of a large company in the retail branche to collect and combine user data generated by various departments and use this for inspiration for new product ideas. The tool is based on theory of empathy in design and on the requirements of the NPD team of this company.

Keywords: empathy; innovation; user data

INTRODUCTION

Proficiency of organizations in conducting (user) research in the fuzzy front end of the new product development (NPD) process has shown to be a strong predictor of market success (Cooper and Kleinschmidt, 1987). Furthermore, gathering and analyzing user data in product development, both qualitative and quantitative, can be a strong driver for innovation in companies. While ideally user data should always be obtained through direct interaction between NPD teams and targeted users, time and cost restrictions often make this impossible within organizations (McGinley and Dong 2011, Sleeswijk Visser 2009). In these cases user data has to be indirectly communicated.

The user in this article is defined as the end user of a new developed product or service. He/she is not necessarily the customer of a company, since customers can also purchase products or services for other end users, such as their children for example. NPD teams in this article are defined as groups of employees of an organization that are responsible for designing new products and/or services. Their composition may differ per company, however they are usually multidisciplinary. These teams have many things to consider and have busy schedules; therefore user issues can often be overshadowed by other important activities (McGinley and Dong 2011). Providing them user data in ways that they can directly use within their design activities could strongly enhance the innovative capabilities of an organization.

However, different departments have different responsibilities and objectives in large organizations, therefore their motivations and ways to gather and document user data might also differ, which can make it less valuable to other teams. Furthermore, employees of large organizations are often mainly concerned with their own objectives within the department. Therefore user data can remain within the boundaries of the department even though it could provide valuable insights to other

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departments as well (if communicated well), such as to NPD teams.

In general, departments such as market research, marketing, customer relationship management (CRM), sales (retail), customer care and [digital] media are concerned with collecting several types of user data. These departments possess user insights which are meaningful to them, but which might be meaningful for other departments as well, such as NPD departments. We believe that transforming existing user data in other departments can be useful for NPD teams as well. We think that structuring and communicating user data from other departments based on principles from empathy theory will help NPD teams to more effectively use user data in their NPD activities. This paper presents a framework for communicating and using user data to and by NPD teams based on empathy in design based on this theory and will apply this by a tool we developed and tested in a case study to evaluate the framework.

INNOVATION STRATEGIES AND THE ROLE OF USER DATA

Different types of innovations require different data sources as input. The design of products and services for current users with current needs typically requires research data that relies upon gathering and analyzing evidence of the current situation. On the contrary, for products and services targeting future users there aren't any directly applicable data, since typical research activities focus on current needs rather than giving a glance into the future. When NPD teams want to innovate by addressing future needs, a thorough understanding of the user, without the constraints of the current context, is essential.

Imagination and intuition are the main mechanisms of NPD teams when starting to think of possible future experiences. They interpret data and call upon their empathic abilities to come up with solutions that will fit in a future context and will be used by future users (Fulton Suri 2008). The job of designers in NPD teams is therefore not accurately describing the world as it is, but rather how it could be, making subjectivity of data desirable. Empathic design techniques could be the key in facilitating this. Within this article empathic design is defined as a design process that utilizes any tool or method that (implicitly or explicitly) aims to enhance empathy within the design team. There are already tools that aim to enhance empathy through presenting data accordingly, like personas (a.o. Grudin and Pruitt 2002), however they have many pitfalls. We propose a framework for structuring and communicating user data to enhance empathy with users, thereby sparking innovation in large organizations.

BUILDING BLOCKS OF EMPATHY

An important aspect of user data is therefore the facilitation of gaining empathy with users, but how can empathy be enhanced in the design process? Empathy can be described as (1) an ability, (2) as a construction of components and (3) as a process (Kouprie and Sleeswijk Visser, 2009). Empathy as an ability refers to a person to identify with- and understand another person's feelings, ideas and circumstances (Brown 2009). Empathy has a cognitive (understanding) and an affective (feeling) component (Baron-Cohen and Wheelwright 2004). Both components should be facilitated through user data in the NPD process. Enhancing empathy with users in design processes is not magically achieved at one insightful moment. Based on psychological theories empathy is a process that runs through different phases. Its application to design consists of four following phases; discovery, immersion, connection and detachment (Kouprie and Sleeswijk Visser, 2009) (see table 1). We suggest that communicating user data to NPD teams should be applied according to these four phases of the empathy process.

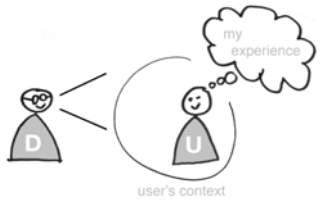
Table 1 The process of empathy consists of four phases: discovery, immersion, connection and detachment. Source: Kouprie and Sleeswijk Visser, 2009.

Discovery	The process starts with the designer approaching the user. He makes a first contact with the user, either in person or by

Entering the user's world

Achieve willingness

studying provoking material from user studies. The designer's curiosity is raised, resulting in his willingness to explore and discover the user, his situation and experience.

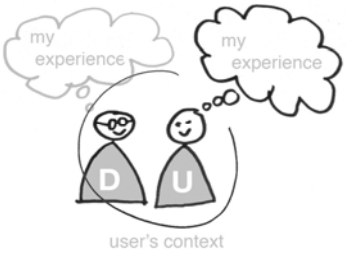


Immersion

Wandering around in the user's world

Taking user's point of reference

After the first encounter with the user's experience, the designer takes an active role by leaving the design office and wandering around in the user's world (data from qualitative user research). The designer expands his knowledge about the user and is surprised by various aspects that influence the user's experience. The designer is open-minded, interested in the user's point of reference. He is being pulled into the user's world, and absorbs without judging.

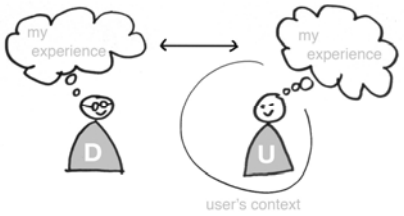


Connection

Resonating with the user

Achieve emotional resonance and find meaning

In this phase, the designer connects with the user by recalling explicitly upon his own memories and experiences in order to reflect and be able to create an understanding. He makes a connection on an emotional level with the user by recalling his own feelings and resonates with the user's experience. At this phase both affective and cognitive components are important; the affective to *understand feelings*, the cognitive to *understand meanings*.

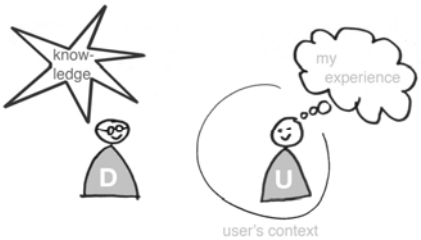


Detachment

Leaving the user's world

Design with user perspective

The designer detaches from his emotional connection in order to become 'in the helpful mode' with increased understanding. The designer steps back into the role of designer and makes sense of the user's world. By stepping back out to reflect, he can deploy the new insights for ideation.



USING EMPATHIC DESIGN TECHNIQUES TO STRUCTURE USER DATA

User data that is collected throughout many layers in the organization hold a potential to inspire NPD teams through empathy. When data is communicated accordingly, using empathic design techniques as in Table 1, it could spark the imagination of NPD teams. When time and cost restrictions do not allow design research to be done by NPD teams themselves, this could be an input for innovation. The data has three levels of characteristics: its content, its form and the

inherent qualities. Different aspects are important in different phases of the process in enhancing empathy. Where for example the discovery phase is mainly about creating the willingness of NPD teams to empathize through evocative pictures and quotes, the immersion phase requires more in-depth analysis through raw data and stories. Content wise this means that the immersion phase will dive deep into the lives of users, revealing tacit information like their ambitions and fears, while the discovery phase mainly aims to attract the attention of a wide range of employees through acquainted demographics. No new information should be communicated in the connection and detachment phase, however the inherent qualities are important. In the connection phase the NPD team calls upon their own experiences to create an emotional link with the user, therefore subjectivity is very important (see table 2).

This framework is based on literature research and expert insights gained through open-ended questionnaires. Firstly literature research was done to extract the potentially important aspects of user data in facilitating the enhancement of empathy in the NPD process. The results of this exploratory phase were implemented in an open-ended questionnaire. Although literature research provided valuable theoretical foundations for a framework, we missed the perspectives from practice. Experts on this matter were therefore approached to validate the preliminary list of important aspects and give their opinion based on their experiences. Three experts shared their insights through the open-ended questionnaire:

- A managing partner and creative director at IDEO
- A researcher and PhD candidate at Brunel University
- An assistant professor at Delft University of technology

The first practical implication for the framework that came out of the questionnaires was that representativeness of an “average” user was not important. As one expert concisely put; *“Real is more important than average”.* In marketing conversations the user is mostly represented by average numbers. This may be true in the objective and scientific sense, but in design research this is less valuable. It doesn’t inspire and one can certainly not empathize with an average number. Furthermore, the word average indicates a certain quantity, and therefore goes in spite of in-depth quality; *“In my experience ‘average’ is a term [that is used] when little depth is intended in user research”*

Therefore ‘representativeness’ as a quality of user data was left out of the framework. On the contrary, the evocative nature of user data to attract attention and spark curiosity in the discovery phase was added as an important aspect. It creates the willingness to empathize and is key for the rest of the process. Furthermore, demographics were found important by the experts as a complementary tool that can help communicating to other departments (like marketing). They are mainly used to working with these kind of parameters and will therefore be more open to a discussion. Therefore these data are most useful in the discovery phase to attract the attention and (in combination with evocative pictures) to create the willingness to empathize. Like these two quotes show; *“Demographic data is a great stimulator to get them (marketers and intelligence managers) excited.” “Different people respond to different stimuli. Some statistical data is often sought to evidence design decisions. The more accessible these are, the more likely they are to be understood and recalled.”*

Also the representation of this kind of (solid) data is considered as complementary; *“Data representations can be an accompaniment, but not the main tool.”*

Since empathy is a human trait and humans recall stories better than sheets of data, every expert underlined the value of storytelling. Storytelling is a form of representing data rather than data on itself. This form of data however requires time to go through, and therefore fits best in the immersion phase. It requires credible sources that have to be communicated explicitly. Every expert also indicated that credibility of user data is very important, like this quote depicts;

"Storytelling can have huge impact, but requires source data to be considered trustworthy." Also personal tacit information (like ambitions, fears, motivations etc.) needs storytelling to be communicated and understood. These points were also indicated as very important by the experts; *"In my point of view you cannot understand underlying motivations if you don't tell stories. There is always a context needed to exemplify the underlying needs and motivations."*

So on the one hand you need stories with credible sources and accompanied by data representations. But on the other hand you would also need data in which designers can immerse themselves. Raw data typically provides this mechanism, while also contributing to the credibility and validity of data. One expert pointed out that raw data helps to show that it is about real people and not some random statistics; *"Raw data [is important] to show that it is about real people."* However raw data, in the sense that it is unrefined, could be too complex to be understood by all. This can work against the "easy to understand" and "fast to use" principles, which are very important in large organizations that work on tight budgets. Raw data should therefore be edited to make it more accessible, while containing its richness and rawness. On the other hand, the "fastness" and "easiness" of data is less important in the immersion phase since it requires time by its nature. Therefore raw data can best be used in the immersion phase, as is also stressed out by the experts; *"Raw data is useful when edited in a way that can quickly be accessed."* The experts did not all agree on the inherent qualities of data. While, as discussed before, there was a consensus about that representativeness not being so important, the thoughts about the 'inspiring' differed. The fact that inspiration is important in the design process is a given, however some experts argued that this was more due to serendipity in the process than a quality you can add to the data. Nonetheless, inspiration is important in the detachment phase in the sense that one leaves the data with new insights gained. These insights are based on an increased understanding of the users and their needs and serve as a starting point for ideation for new product/service concepts. So in that sense a valuable quality of the data is inspiration, even though it is impossible to consciously implement this in the data. This was confirmed by the experts; *"[Inspiration is] difficult to generate or demand and quantify. Serendipity." "Inspiring is important, but that always happens."*

As last, there was a consensus about the fact that data should be easy to use and fast to implement. However, it was also clear that the represented data by its nature is not easy. So if one should take the time to immerse in it to empathize, the "easiness" is not the most important factor anymore. (Even though accessibility for all should be maintained.)

Concluding, the expert interviews confirmed the findings from literature but added more details to be able to fill in the framework (see table 2).

Table 2 A communication framework to enhance empathy. For each phase of the empathic process, a set of preferred data types is presented according to its content, form and qualities.

	Discovery phase	**Immersion phase**	**Connection phase**	**Detachment phase**
Content of data	Demographics Social context Physical context	Personal tacit information Social context Physical context	-	-
Form of data	Visuals Photographs Quotes	Storytelling Raw data Video clips	-	-
Qualities of data	Fast to use Easy to understand Evocative/provoking	Credibility Validity	Subjectivity	Inspiring

THE DESIGN AND TESTING OF A TOOL TO INSPIRE NPD WITH USER DATA

The framework was applied by developing a tool, consisting of a sharing platform and a game tool for workshops in a case study. The organization for the case study is one of the largest companies

in the retail branch globally. It operates more than 3000 stores and has over 200 000 employees in 10 countries in Europe and the U.S. Although the company has built up a lot of knowhow about their end users, it has failed to share this effectively interdepartmentally till now. A proposition was done to the company to tackle this problem based on internal interviews within the organization and the framework we propose. Its most important requirements were the accessibility, its ability to inspire and the amount of time it would take to use it. Since the NPD team members in the organization are rather busy with their daily tasks, and work on a tight budget, they don't have the means to spend much time on investigating user data. The result is a combination of a sharing platform (video and large screens across the organization) where employees can plan presentations and invite their colleagues, and a game tool that they can use together to translate the newly gained insights into concrete product ideas. This concept is based on the four phases of the empathy framework.

Discovery – The main goal of the discovery phase is to create curiosity and willingness to empathize with a person. The important aspects of data, as can be seen in table 2, are therefore implemented in the tool. The discovery phase starts by inviting your colleagues to the presentation that you want to give about a new insight. An agenda function, with playback options of some kind is therefore needed. This agenda function encompasses all the relevant elements from table 2, like demographics of the target group, evocative pictures explaining the new insight and quotes. The organization has an infrastructure with large screens in their offices, so with some additions of inspiring data (think of TEDtalks and youtube), it is easily understandable and fast to use.

Immersion – The immersion phase is facilitated by the choice of the medium itself, presentations. After being triggerd by the first numbers, pictures and quotes, storytelling and narratives are needed for the NPD team to be able to immerse in the user data. Here the presenter (often someone who was in charge for collecting and analyzing the user data in his/her department) will explain and show their results.These are an integral part of presentations. But it also gives the opportunity to show video's of real people, which could give a glance at more tacit information. Raw data can be presented in a way that the audience can understand it, thereby making it more accessible while keeping its value.

Connection & Detachment – In the connection and detachment phases no new information is communicated. Rather the employees have to reflect on their own experiences or from their relatives to be able to understand the user data on an emotional level and be able to connect with the users. Then they have to detach from the users' worlds and step back in the helpful mode and be in another mindset (of ideation).

These phases were facilitated in the concept by a game tool to be used in workshop that was developed especially for the company in the context of this project (see figure 1). The tool aims to finish the process of enhancing empathy for a target group, while also making the step to translating these insights into new ideas for the company. Therefore it encompasses several ideation techniques, but also makes the employees reflect on their own experiences with the target group, making subjectivity of data possible. The group discusses and defines a persona in the game tool based on the new insight and their common experiences. This gained knowledge is then used as inspiration for ideation.

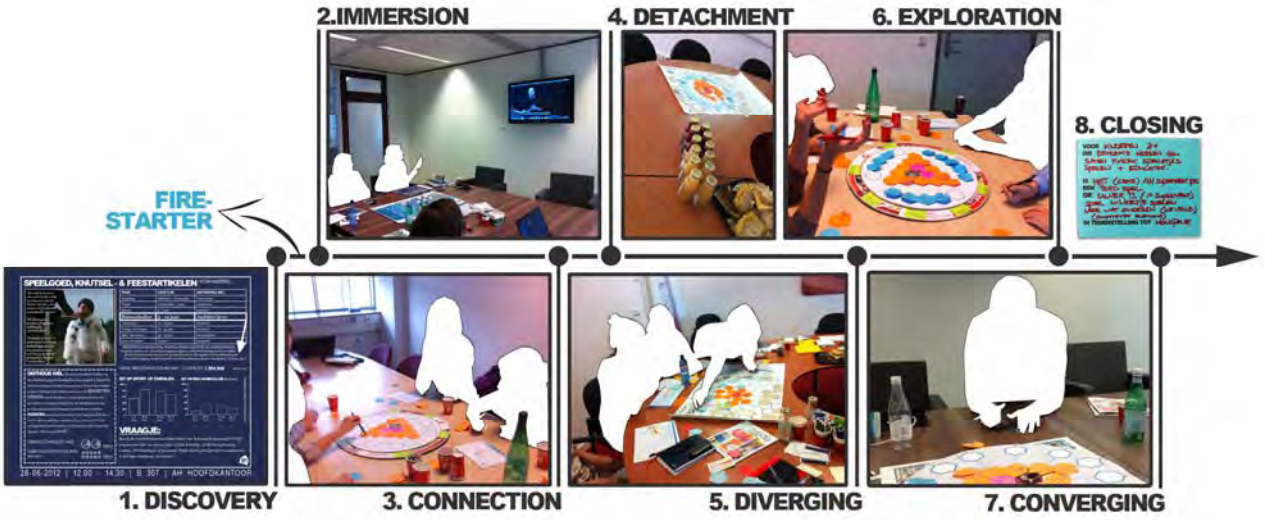


Figure 1 The tool consists of a sharing platform, providing sparks of user data and richness to immerse, followed by a game tool which supports connection and detachment of the empathy process and continues with supporting the creative process; diverging, exploring, converging and closing.

The tool was tested in a series of three workshops where the sharing platform was simulated and the game tool was constantly improved by experimentation. In a multidisciplinary setting the tool was used to treat real problems of the company, thereby also introducing the new way of working to employees throughout the organization.

DISCUSSION

The results of the workshops with these tools were surprisingly well received by the participating employees in terms of fitting the customer's needs and innovativeness. Using the existing displays through the company served as triggers raising curiosity and willingness to participate in a workshop. Video was a powerful tool as a means to get people immersed in the user data. However, watching video is a rather passive way of being informed, and after watching the video presented by the facilitator, the raw data is gone. In the second and third workshop we tackled this by adding prints of video fragments to be used in the game tool. The connection step worked also well, although we are still searching for a better balance between emotionally connecting with the users' stories, which needs time, and speeding up the workshop since the employees don't have much time for workshops. The benefit we saw by doing this step in the game tool is that the participating employees share their own experiences and also prejudices towards the target group with each other. They have a moment to talk together about the target group and about themselves. By discussing their different views and experiences they learn more about the nuances about the target group and realize it is about everyday people like themselves. Even though this is still a rather quick step, which theoretically would need more process time, it provides a quick deeper understanding of the users. Other than the concrete things such as the videos and game board, the process behind it got lots of compliments by the employees, underlining the importance of empathy and human-centered design. One of the category managers that came up with a viable and desirable idea said; *"Why don't we do this for all our product ranges?"*

CONCLUSION

This paper discussed a case study about a new sharing platform and a game tool for workshops for a large company in the retail branch. The development of the platform and the tool were based on empathy theory from literature and on a questionnaire with experts in this field. The case study

has shown that the empathic process can be applied to the activities and process within this company, benefits the understanding of users and supports idea generation for the NPD team. This was just one case with one particular company. Further research will focus on the implementation of the framework for other NPD companies. The implementation of empathic design techniques to drive innovation in an organization can be complex, but moreover has many benefits. This framework will provide organizations a simple reference to structure and communicate user data. Now user data that holds these insights can stay idle within the departments that have collected them. By using this framework to share these data organizations can enhance empathy of NPD teams with users, thereby improving their innovative capabilities.

ACKNOWLEDGEMENTS

We would like to thank the participants of the questionnaire and the involved company for their involvement in this project.

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DEVELOPMENT OF A RETAIL BRAND ENHANCEMENT TOOL THROUGH THE USE OF EMOTIONAL DESIGN THEORY

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Design is created to fulfil the needs of its users, and its functions are constantly assessed by such users. In a retail environment, design elements should also represent the brand vision that the company wants to communicate to its customers. Understanding how design elements influence customers' emotions in a retail environment is vital for brand managers and designers; however, such information is difficult to gather and analyse, since it requires decoding layers of emotional responses from customers with regard to the design elements within the overall retail environment.
This paper proposes an emotional mapping tool for brand managers and designers to use when analysing customers' emotional responses towards a retail environment. The foundation of this tool is derived from emotional design theory, in particular Norman's three levels of human processing - visceral, behavioural and reflective (Norman, 2004). The tool is then modified further after being tested in terms of an empirical case study of a large UK based supermarket brand and one of its stores. The findings suggest that the proposed tool is useful for customers when it comes to describing their emotions associated with a particular retail environment, and helps brand managers and designers to understand the emotional feelings customers experience in such a retail environment.

Keywords: Brand experience; emotional design; retail branding

INTRODUCTION

Design is closely related to emotion. According to marketing specialist Darrel Rhea (1992), the real challenges come when designers step back and reassess all the ways a design might influence and benefit customers emotionally. In product design, emotion has been a popular research topic, mainly in terms of achieving an understanding beyond the aesthetic and functional aspects of design roles for ordinary products.

How about retail design? Since marketing and economics are shifting from commodities to services, creating a memorable visitor experience in a retail environment has become increasingly important (Floor, 2006). By creating memorable customer experiences, differentiating oneself from one's competitors is becoming one of the crucial objectives for many retail stores (Vehoef et al., 2009). Companies can maintain strong customer relations by creating memorable experiences.

As a subject, emotions are not easily measured and quantified because of their complexity (Hirschamn, 1982). According to Norman (2004), there are several factors that influence customer emotions and behaviour such as personality, education, culture and the context of visiting the retail environment. However, it is essential for brand managers and designers to know what customers experience in a retail store in order to provide better design and enhance brand communication.

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The main purpose of this study is to evaluate the emotional elements that a retail store provides to visitors by mapping customers' emotional reactions to each design element within the retail environment. The emotional mapping tool presented here aims to support brand managers in understanding their design outcomes in a retail store, as well as providing clues to evaluate the design elements that reflect their brand vision. In particular, this tool can be used when a retail brand has to remodel itself. Based on the evaluation of design elements in a retail environment, brand managers and designers can identify what should be improved emotionally in the retail store. By tracing visitors' emotional experiences, brand managers can assess design elements that influence visitors' feelings.

RESEARCH BACKGROUND

Prior to developing the emotional mapping tool, literature reviews on brand experience and emotional design were conducted to understand how emotions could influence on creating design and customers' purchasing behaviour. Existing tools measuring human emotions were also reviewed to determine whether they can be useful to evaluate design elements in a retail environment and adaptable when developing the tool.

Since brand experience has attracted a lot of attention in marketing, marketing practitioners have come to realise that understanding consumers' brand experience is crucial for developing marketing strategies for goods and services (Linstrom, 2005). Several research methods for analysing consumers' attitude towards a brand have been developed (Thomson, et al, 2005). However, there is little evidence of research in measuring brand experiences within a retail environment (Brakus, et al, 2009).

Regarding emotional design, various studies and theories have been suggested in order to explain the role of emotions in design aspects. Especially, in the field of product design, designers consider emotional design as a tool they use to deliver their messages and emotions, while some suggests that it is individual experience and response when users use objects (Ho and Siu, 2009). Even if the terms used to describe the emotions can be translated into different ways, emotions that cannot be clearly separated from cognition and functionality (Norman, 2004) are one of the main factors influencing customer's purchasing decision.

RESEARCH PROCESS AND METHODS

In order to design the tool practically, the Double Diamond Design Process model, which describes the general design process, was adopted for this research (see Fig 1). The process consists of four stages – 'discover', 'define', 'develop', and 'deliver'.

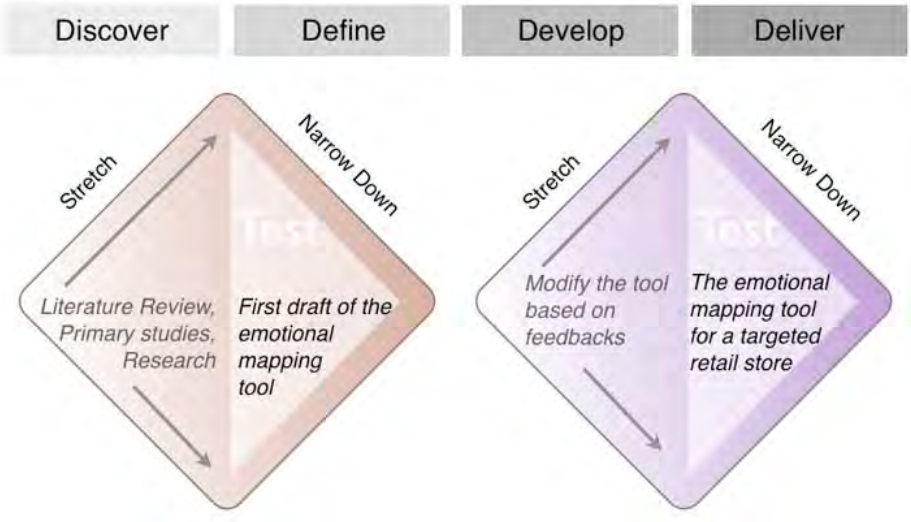

Figure 1. Double Diamond Design Process (source: Design Council, 2005).

- Discover – Through literature review in the areas of brand experience, emotional design, brand management, retail design, and interviews with experts in branding and interior design as well as observation of six fashion and mobile phone retail stores, the first prototype of the emotional mapping tool was developed.
- Discover – Through the literature review of the areas of brand experience, emotional design, brand management, retail design, and interviews with experts in branding and interior design, as well as observation of six fashion and mobile phone retail stores, the first prototype of the emotional mapping tool was developed.
- Define – A sample group consisting of seventeen participants was identified as being suitable interviewees, and four types store within the retail sector – mobile-phone, grocery, fashion and coffee shops - were chosen to test the tool. In this way, the similarities and differences in the importance of customer needs and wants, and their design expectations of a store in different retail sectors could be identified, and could provide useful information for modification of the emotional mapping tool. Individual interviews generally took 40 minutes each. The tool consists of 49 picture images distributed over the three emotional levels.
- Develop – Based on the data and comments collected from a sample group, the results were analysed and areas for improvement were identified. Appropriate methods for data analysis were also explored.
- Deliver – Lastly, based on the feedback obtained, the emotional mapping tool was modified to focus on a targeted retail store of a large UK based supermarket brand.

DEVELOPMENT OF THE EMOTIONAL MAPPING TOOL

For the sake of simplicity, the design of the retail brand enhancement tool is based on Norman's (2004) three levels of human processing –visceral, behavioural, and reflective. The visceral level is about how things look and feel. Visceral appeal is fast, sometimes instant, and most products have it to some degree. On the behavioural level, the emotional impact is guided mostly by function and usability. In this level, product appearance is not viewed as important as performance. The reflective level is about message and culture. It is also the stage in which brand image and marketing come into play. Products are sold not on their functionality, but on aspects such as reputation and uniqueness. The ways in which the three levels interact is complex. However, for the purpose of application, the three levels make it possible to understand how emotions can be mapped and distinguished, based on product characteristics. For this reason, these three levels can be adopted to evaluate the emotional impact of a retail store.

In the retail brand enhancement tool, these levels are explained with pictures and words, because images make it easier for the interviewees to describe their experience, and for designers to understand what interviewees want to express. With this tool, the brand manager is able to trace the design elements that visitors unconsciously consider, as well as understand how in-store communication tools like merchandise, visual displays and employees influence customer emotions (see Fig 2).

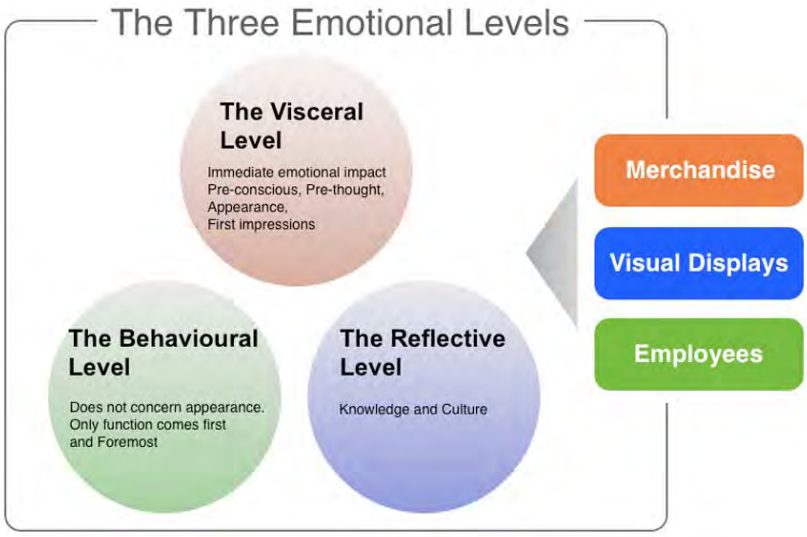

Figure 2 In-store communication tools with the three emotional levels.

FRAMEWORK OF THE TOOL

Based upon the three levels of emotional design theory, the tool is divided into three categories; the visceral level (appearance), the behavioural level (effectiveness of visiting, brand positioning), and the reflective level (personal satisfaction, self-image, memories).

THE VISCERAL LEVEL

On the visceral level, the body's reaction to sights, sounds, what can be touched or smelled, is dealt with. Using images (eye, ear, hand, nose), an interviewee is asked to describe the level of their visceral reaction to merchandise (products, packaging), visual displays (product density, method of presentation, number of displays, information on in-store signage and graphics) and employees (role of employees, kind of contact with customers, expertise) (See Fig 3).

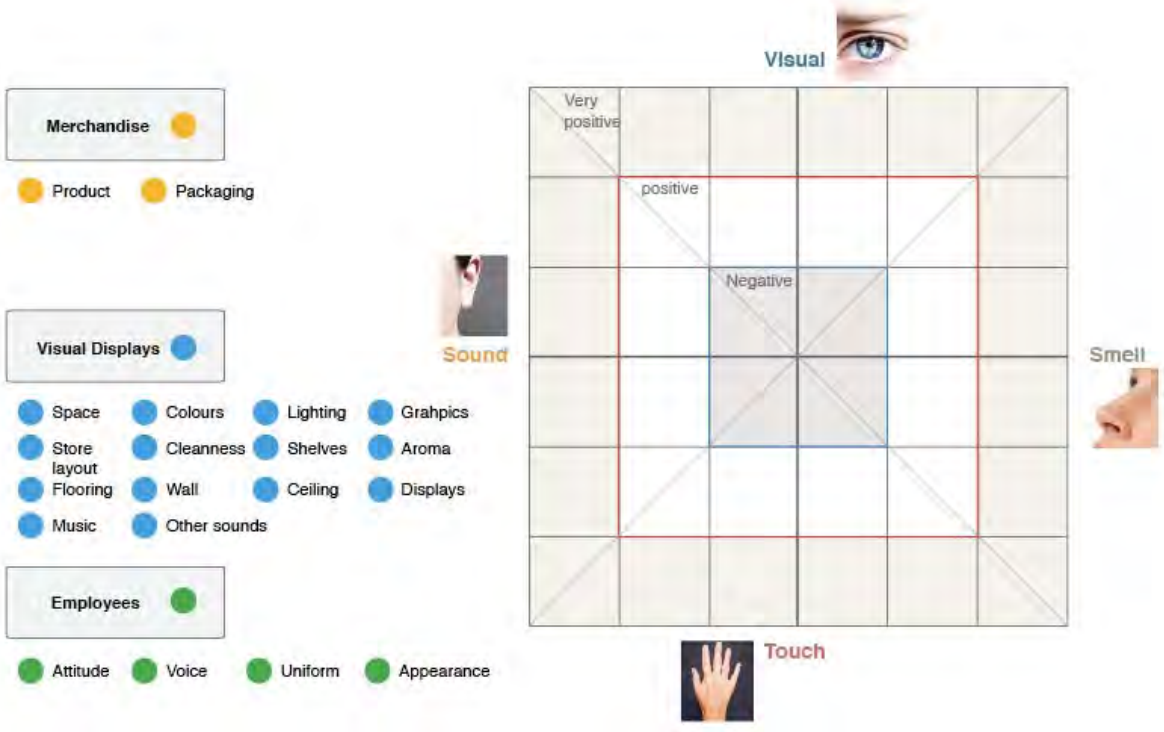

Figure 3. The visceral level of the emotional mapping tool.

From the data gathered in this level of the tool, we can:

- identify which emotional sensory inputs have the most influence;
- rank every design element related to sight, smell, touch, sound causing customers experience based on in-store tools; and
- access the experience at the visceral level.

THE BEHAVIOURAL LEVEL

On the behavioural level, only functional aspects are considered (Norman, 2004). By using six categories of images with words describing the retail brand's position during the store experience, consisting of entertainment, expertise, design, hedonism, lifestyle and bargain (Floor, 2006), an interviewee is asked to choose the pictures that reflect his or her experience. Brand messages are also assessed here (See Fig 4).

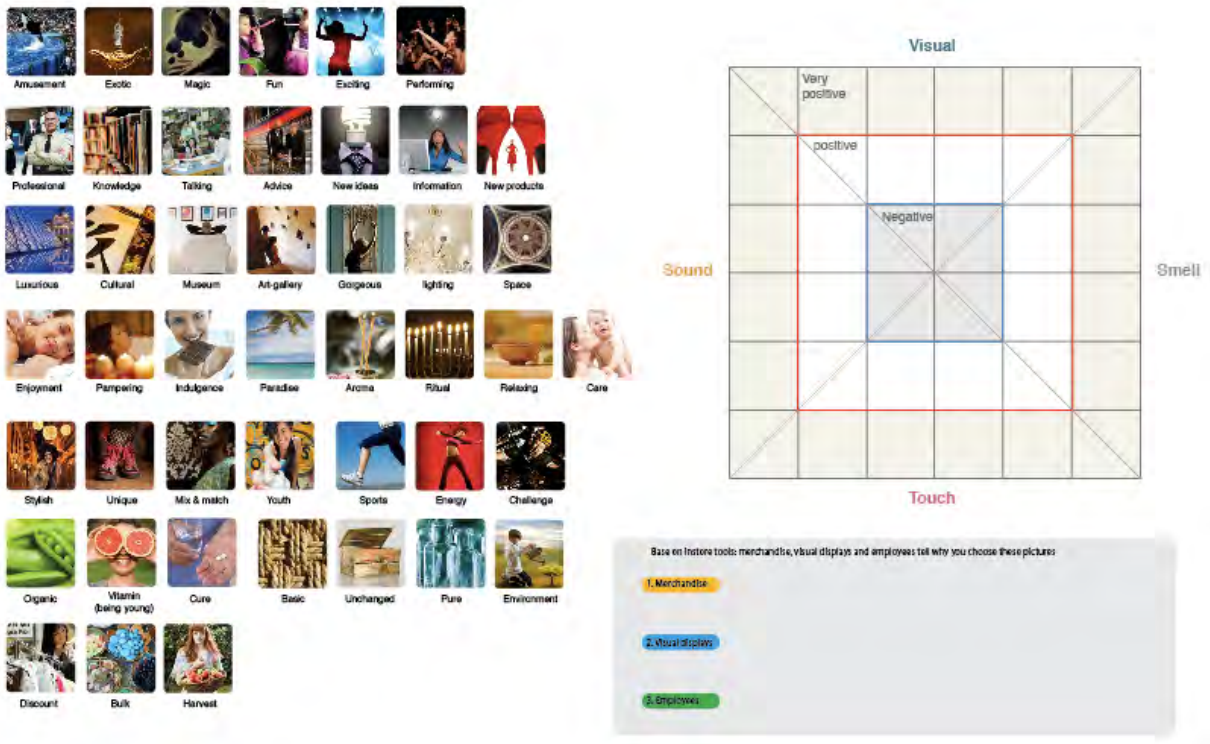

Figure 4. The behavioural level of the emotional mapping tool.

In this part, we can:

- identify the type of store experience the retail environmental provides;
- rank in-store communication tools in each category; and
- rank retail performance.

THE REFLECTIVE LEVEL

On the reflective level, elements of culture and meaning are addressed (Norman, 2004). This part asks what elements a retail store provides for visitors in terms of evoking feelings or memories. The reflective level is all about message, culture, and the meaning of brand or place. There is nothing practical, nothing biological, about the answers. Interviewees are encouraged to talk about design elements including service that evokes their personal satisfaction, self-image or memories, such as personal nostalgia or seasons. (See Fig 5)

Figure 5. The reflective level of the emotional mapping tool

From the data gathered in this level of the tool, we can understand the design elements which evoke visitors' feelings and memories.

IMPLEMENTATION OF THE TOOL: MORRISONS SUPERMARKET

Through previous primary research, it was found that the images and words used in the tool helped interviewees to narrate their emotional experiences in retail stores. However the data collected from the sample group was somewhat general which made it difficult to analyse the meaning in more detail. This indicated that the questionnaire in the emotional mapping tool needs to be designed with a specific retail store in mind for practical purposes. The details of its in-store communication tools should also be incorporated .

A TARGET RETAIL STORE: MORRISONS SUPERMARKET

Based on the analysis of the previous questionnaire and participants' feedback, a tailored emotional mapping tool has been developed to focus on a British supermarket brand - Morrisons Plc. The questionnaire has been modified to explore each design element in a Morrisons supermarket. A sample group consisting of ten participants conducted computer-based interviews. They not only answered the questions, but also talked about their personal opinions regarding retail design elements that evoke their personal memories while being interviewed. Prior to the interview, the research procedures were explained to them and Morrisons' indoor images were shown on a computer screen.

THE VISCERAL LEVEL

Each design element that can influence visitors' emotional feelings was listed. The emotional response areas were divided into three categories: very positive, positive and negative. The sample group was asked to rate each design element in terms of the emotional response areas.

THE BEHAVIOURAL LEVEL

Based on six categories of retail brand position (Floor, 2006), the images that can represent Morrisons' brand vision were selected by the sample group. Interviewees were asked to rate the images in terms of three different emotional response areas, and to narrate the reasons why they

chose images based on in-store communication tools: merchandise, visual displays and employees.

THE REFLECTIVE LEVEL

The images that were used in the previous emotional mapping tool seemed to have interrupted both the narration of personal experiences and finding design elements that can be linked to their previous memory of retail stores. On the reflective level, answers were closely related to personal knowledge and culture (Norman, 2004). Hence, it was decided not to use any images on this level. However, in a supermarket, the space tends to be bigger and the range of product is more diverse than in any other type of retail store. There is a possibility that the interviewer does not know where the interviewees' emotions originated. For this reason, interviewees were asked to indicate the sectors which prompted these emotions.

RESULTS AND FINDINGS

WANT AND NEEDS

In terms of products associated with 'Wants' and 'Needs' in Morrisons, eight answered 'Wants' are equal to, or higher, than 'Needs.' They responded that in terms of in-store communication tools, merchandise and visual displays determined their priorities. Two interviewees whose answers were 'Needs' are higher than 'Wants' mentioned that employees were the most influential elements in terms of in-store communication tools (See Fig 6).

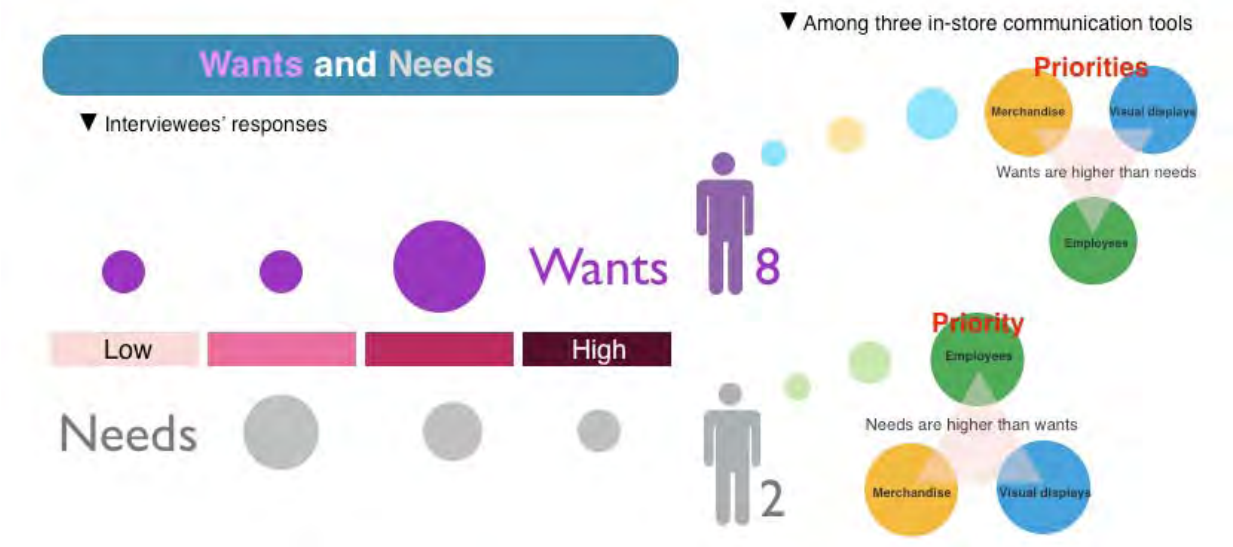

Figure 6. The responses of the sample group's 'Wants' and 'Needs'.

THE VISCERAL LEVEL - MERCHANDISE

Providing various products is the strongest immediate emotional impact that interviewees experienced in Morrisons. The sample group mentioned that even if they spent more time looking around Morrisons than other supermarkets, they enjoyed their time at the store. As regards packaging, Morrisons' co-operative packages were the main point of focus. As a personal test, three of the interviewees revealed that the colours shown on the Morrison's packages, i.e yellow and green, prompted a negative response (See Fig 7).

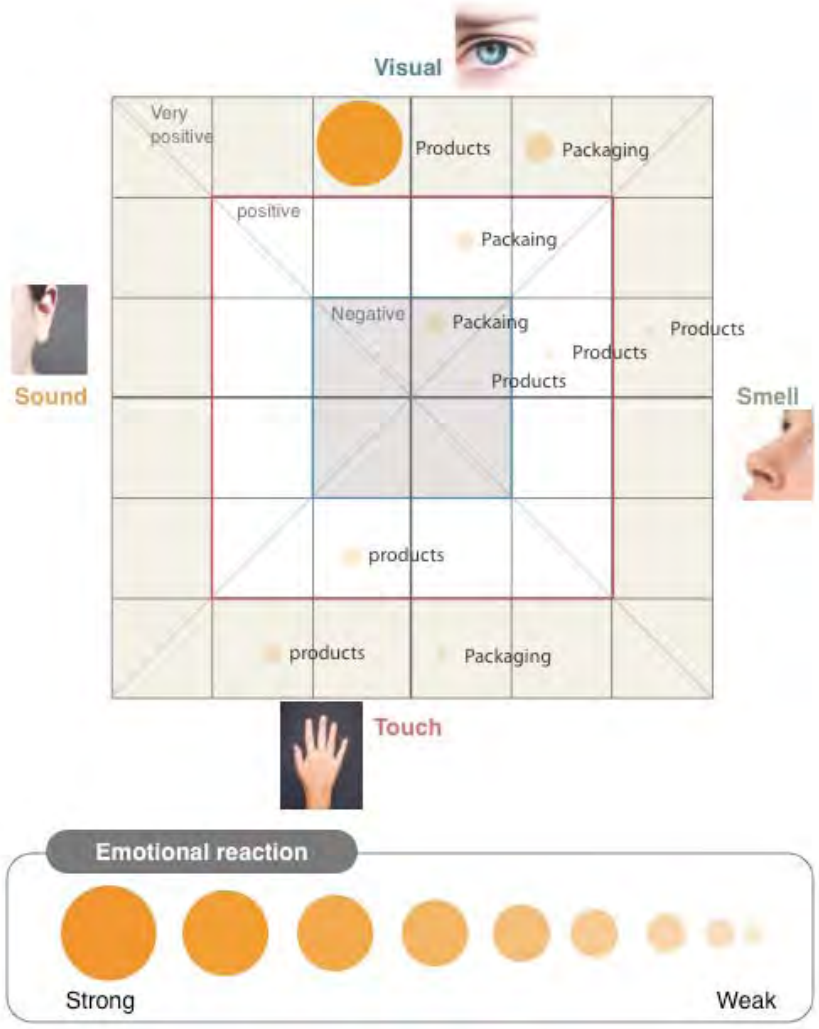

Figure 7. The sample groups' responses on the visceral level regarding merchandise.

THE VISCERAL LEVEL – VISUAL DISPLAYS

In terms of interior design, there are many design elements consisting of visual displays. The elements are divided into two parts: non-aesthetic and aesthetic. As a non-aesthetic visual display, cleanliness is one of the positive aspects that customers experienced at Morrisons. The sample group generally considered Morrisons to be a big supermarket, but when it came to design, cleanliness ranked higher than other elements. Regarding negative comments, walls, ceiling and flooring were selected because of their plain design (See Fig 8).

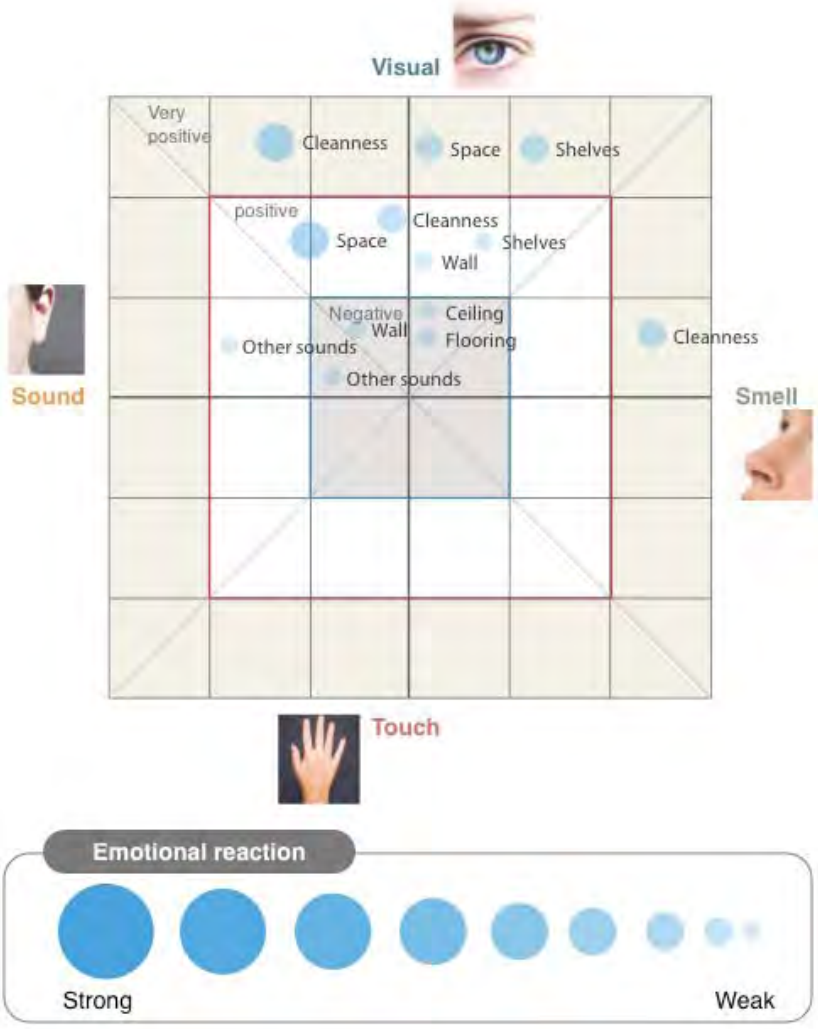

Figure 8. The sample groups' responses on the visceral level regarding non-aesthetic visual display.

In terms of aesthetic visual displays, store layout for convenient shopping was one of the positive elements that Morrisons provided. Overall, Morrisons provided a satisfactory interior design, even though two interviewees did not like the Morrisons colour scheme. The smell of fresh bread and cooked meals provided interviewees with positive feelings, and helped differentiate it from other supermarkets. Seven of the interviewees mentioned they wanted to hear soft music whilst shopping (See Fig 9).

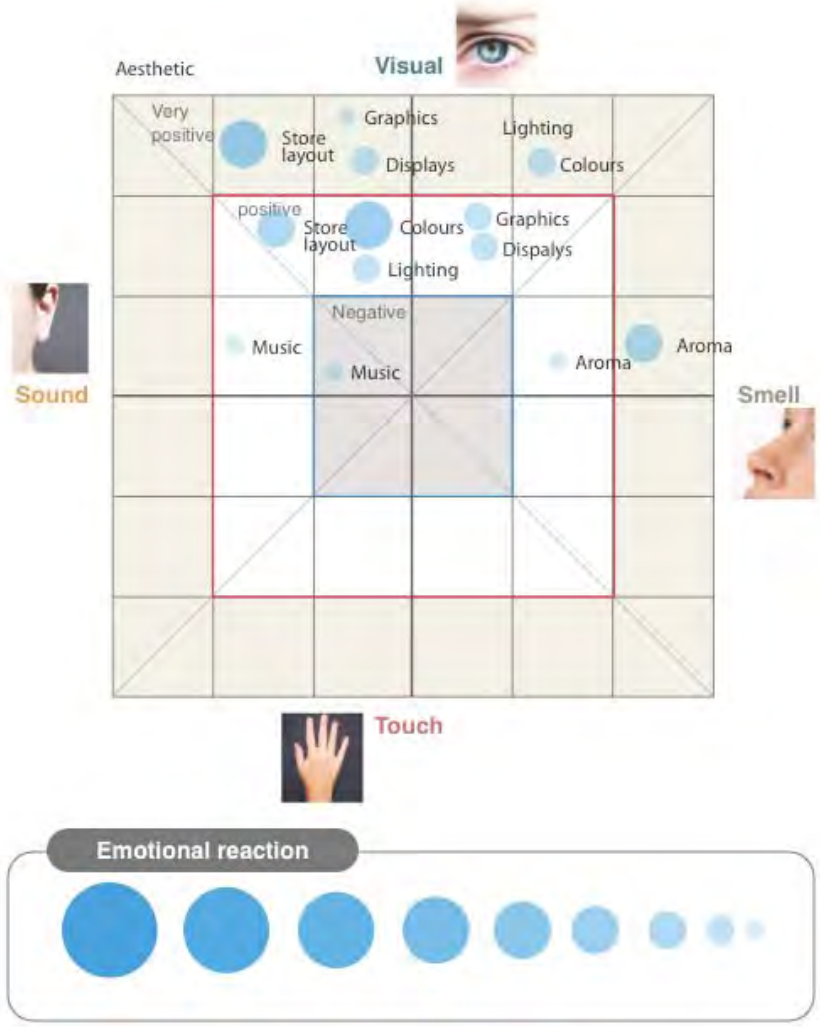

Figure 9. The sample groups' responses on the visceral level regarding aesthetic visual display.

THE VISCERAL LEVEL – EMPLOYEES

A sample group responded that employees' appearances and voices gave them a positive impression. When it came to uniform, it did not generate a strong positive feeling among the sample group, but all of them answered that they could distinguish successfully between staff and customers due to their uniform. Six interviewees had experienced being treated in an unfriendly manner by employees at Morrisons. On the other hand, they said that it was hard to comment negatively about all employees, because other employees provided a nice, welcoming and good service (See Fig 10).

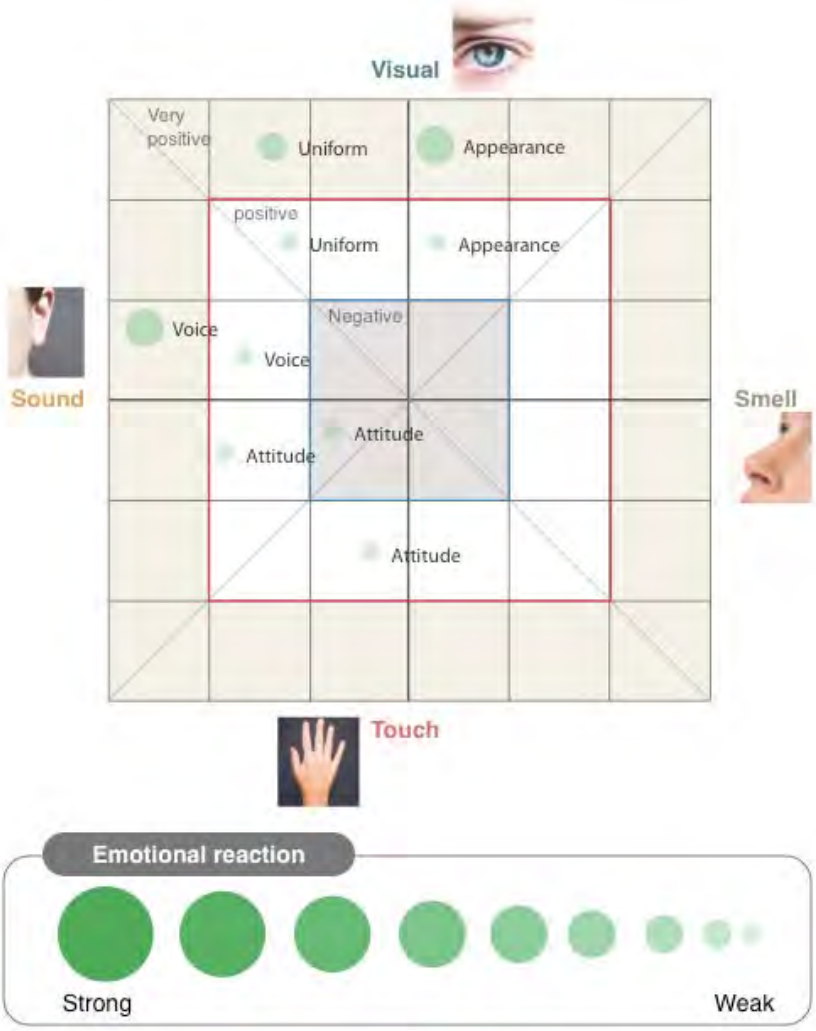

Figure 10. The sample groups' responses on the visceral level regarding employees.

THE BEHAVIOURAL LEVEL

On the behavioural level, through the selected images of the sample group, we were able to determine what kind of brand messages visitors actually experience in the store. The sample group selected organic, professional images as very positive brand positions. New products, harvest, space and environment images were chosen as the positive brand positions. As a negative brand position, a talking image was selected (See Fig 11).

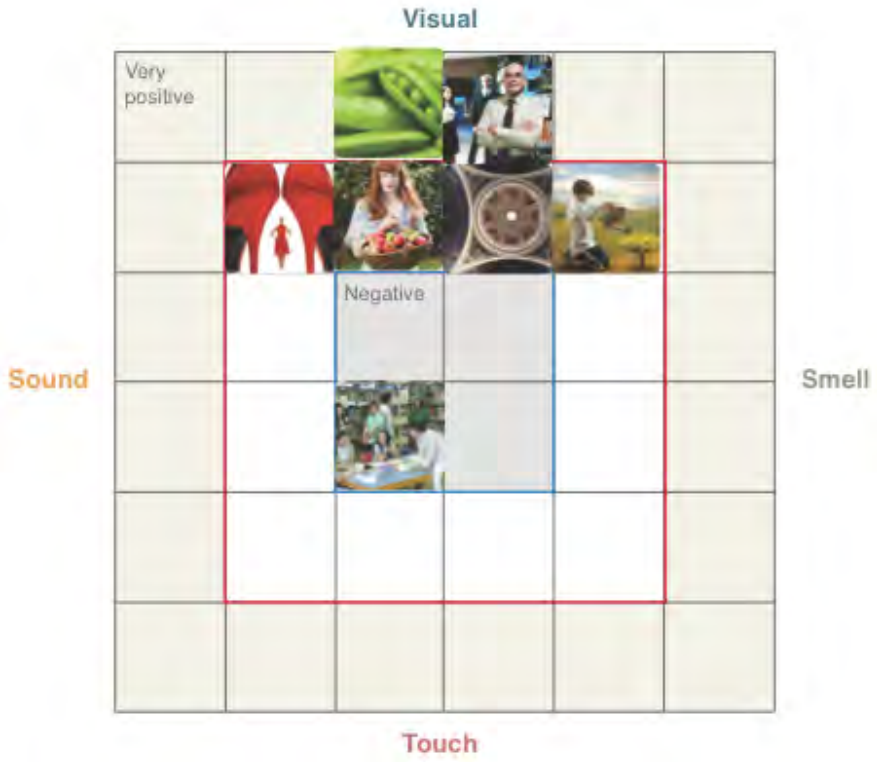

Figure 11. The sample groups' responses on the visceral level regarding employees.

In order to deliver its brand vision to be the 'Food Specialist for Everyone', Morrisons offers six categories of message within their stores : freshness, value, service, various, environment and seasonal images. By comparing the sample group's responses, it can be evaluated whether the functional elements which deliver the brand vision of Morrisons, are well reflected or not.

The brand vision of Morrisons has been compared to the responses of the sample group. The results indicated that its brand vision is delivered clearly, because eight interviewees from the sample group chose the image of professional, which represented an expertise brand position. The chosen images such as organic, new products and harvest by the sample group also represent the messages that deliver the Morrisons' vision, which are positively acknowledged.

However, in the case of environment, based on the sample group's explanation of reasons why they chose the image, it was revealed that Morrisons' message on environmental issues has been delivered in different ways in the store. For instance, Morrisons made an effort to recycle and reduce the amount of packaging, but only one respondent made reference to this activity. The rest of them made a choice based on the brand colours.

There were no images that were matched with service and the seasonal brand position of Morrisons (See Fig 12). This means that service and seasonal brand position have not been recognised by customers and need to be strengthened.

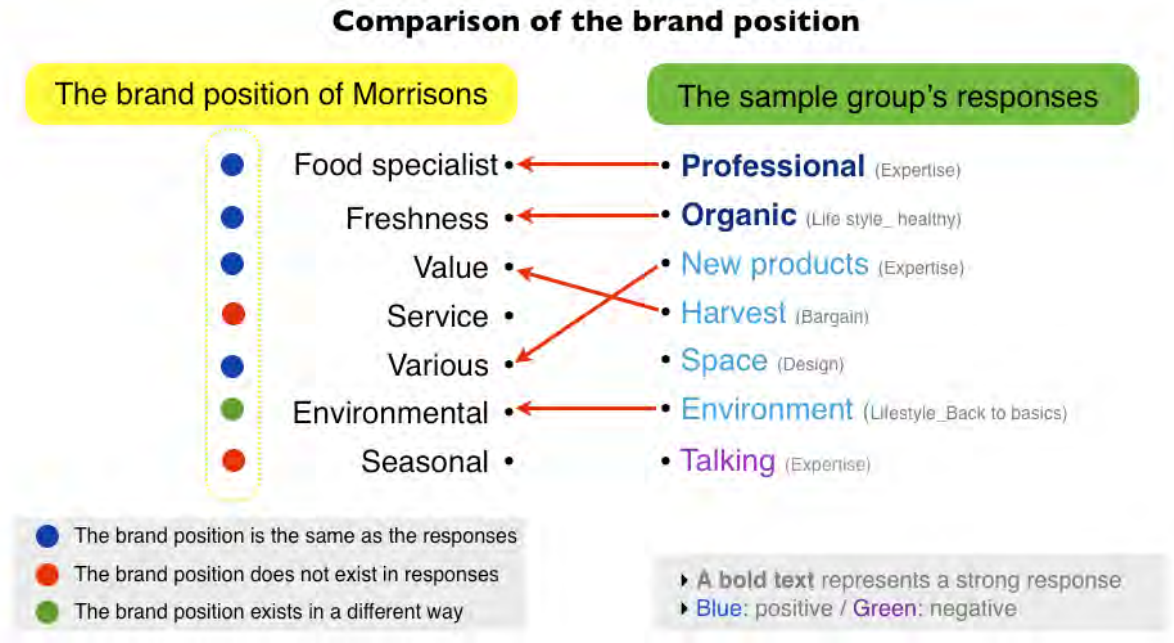

Figure 12. The comparison of the brand position of Morrisons.

THE REFLECTIVE LEVEL

Interviewees answered that it was hard to identify the design elements that evoked their previous memories or perceptions. Four of them, notably all from foreign countries, mentioned products, and their package design. In addition, smells evoked memories of their native countries. While conducting interviews, it was discovered that they viewed themselves as smart customers through finding a new range of products or discounted products.

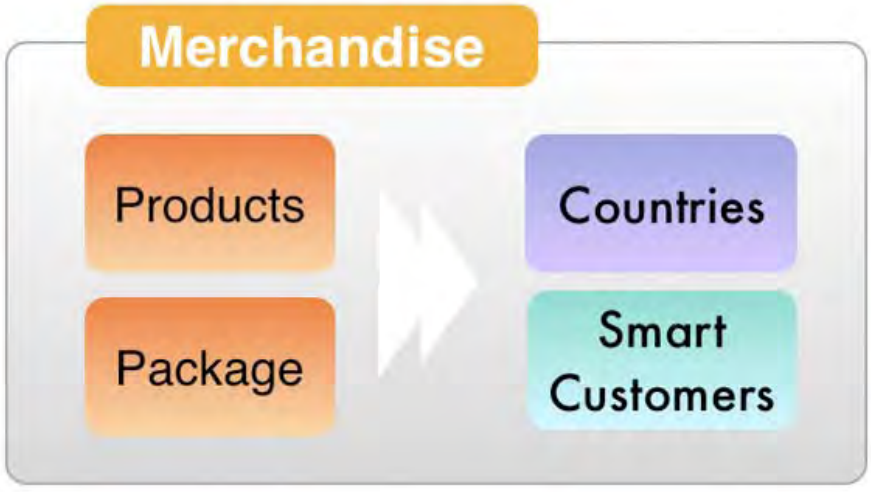

Figure 13. The sample groups responses' on the reflective level.

There are three main sectors that provide strong emotional feelings (see Fig 14).

- The fruit & vegetables sector
- Fresh to go and the deli sector
- Oven baked goods sector

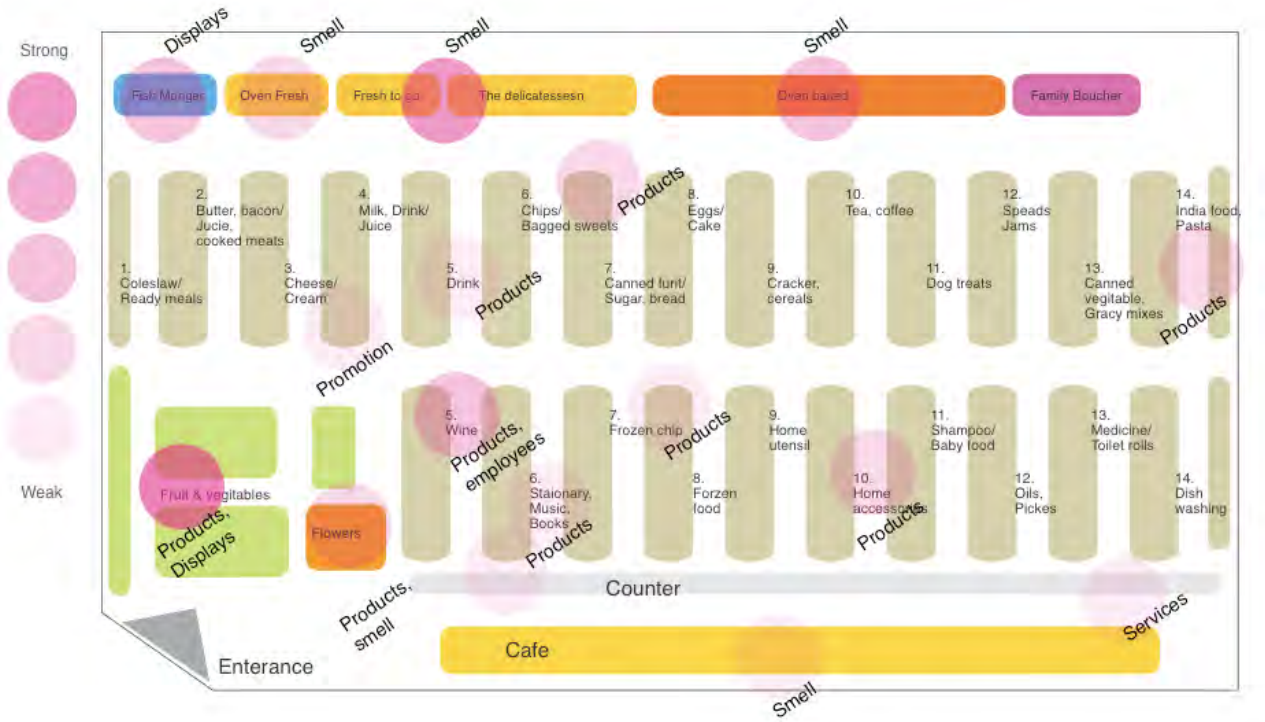

Figure 14. The sectors where the sample groups received emotional feelings in Morrisons.

The chosen sectors that the sample group cited as having the strongest emotional impact provided more emotional elements than other sectors. This was not only in providing a sensory experience, for instance the smell of oven baked products, but also the way of displaying products or products. These all play a vital role in creating emotional sectors in Morrisons.

DISCUSSION

Emotions involved in the customer experience have become a vital object of study in design. However, the majority of studies are focused on how a product's appearance influences the users' experience, not on the brand or the retail environment. Although all of the studies regarding emotions mention that emotions play an important role in customer behaviour, there are no clear explanations on how we can evaluate emotions.

Through the emotional mapping tool, we can gain an insight into what positive and negative emotional design elements are in a retail store. It also explains how customers understand the brand vision that triggers functional emotional responses. Lastly, the design elements that are linked to customer experience in a retail store have been understood.

In order to create an emotionally powerful retail environment, there should be more understanding of customer emotions regarding brands. However customers never say what they want or what they feel.

By making customers describe their emotions, brand managers and designers can get more significant feedback in terms of their design outcomes. Both the narrated data collected and the analysis method play an essential role in remodelling a better retail environment for customers.

CONCLUSION

The emotional mapping tool has been developed to provide brand managers with the clue that design elements can be evaluated from the customers' point of view, through three emotional levels. Design, brand and emotions are intangible and so complex that it is believed that measuring these values is impossible. However if customers are asked to narrate each design element in a

retail store based on emotional design theory, they can not only respond with their immediate impressions of design elements, but they can also seek out those design elements which have stuck in their minds.

By ordering senses, customers can form a memory of each retail store differently. Even if sight is the most immediately powerful sense that influences customers' emotions, other senses such as smell and sound can also play an important role in providing brand experience to the customer in a retail store.

One of the most important findings was the evaluation of the sample group's feelings. On the visceral level, by comparing all the design elements in a retail store, the positive and negative elements that evoke emotions in general can be discovered. On the behavioural level, by comparing interviewees' chosen images, whether or not the brand vision has been clearly demonstrated to customers can be evaluated. If not, we can ascertain which messages which aim to reflect the brand vision have not been delivered. On the reflective level, there are no sure answers, but it has been found that people try to link their previous memories with products.

The three levels need to be analysed in different ways, but finally it provides us with the big picture of current retail stores that explains how customers experience the retail environment on an emotional level.

The emotional mapping tool presented in this paper is an example of the practical use of the three levels of emotions. Based on emotional design theory, the tool can help brand managers and designers to trace customers' experience and assess the overall retail environment.

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INNOVATION VERSUS CONFORMITY IN LOGO DESIGN

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As design and branding have taken on new importance in business in recent years, logo design has almost paradoxically been studied less often. This paper addresses the topic using a quantitative approach to call into question the traditional belief that logos serve only to differentiate. It is asserted that another critical function of logos is to provide legitimacy by conforming to design norms within industries. Similarity of logos within industries is examined using analysis of trademark registration data from the United States Patent and Trademark Office. Logos of Apple Computer and Lucent Technologies are discussed as examples of ineffective and effective innovative, or "deviant," logos. Further analysis of USPTO data addresses the question of whether innovation or conformity is a better strategy in adopting a logo design.

Keywords: Logo design; Branding; Corporate Identity

INTRODUCTION

In recent years, as design and branding have assumed more important roles in the world of business, there has been an almost paradoxical decrease in concern with the subject of trademark and logo design. For years, these graphical elements were at the forefront of corporate identity design (Mollerup 1997). But as design and branding evolved and became more sophisticated, their practitioners deemphasized logos and trademarks (Aaker 1991; Ries and Ries 2002). There was far more to design and branding than graphic symbols, they argued correctly. Yet the logo remains the single most visible and powerful element of any design program and its design is therefore worthy of our attention. As Myerson (1989, 13) put it, paraphrasing designer John Sorrell, "while logotypes and trademarks are just the tip of the iceberg, iceberg tips are actually rather important because they're the things you can see."

As the practice and profession of logo design evolved in the twentieth century, so did a design philosophy that established the ideal that logos should provide a unique image for the organizations and products they represented. A mark's ability to differentiate was seen as its most important feature. This was consistent with the original notion of trademarks as unique identifiers of the products of a particular craftsman, a notion that survived in the legal definition of trademarks. This principle was repeated over and over in the trademark design literature:

- "The properties of being different and unusual…particularly constitute a good trademark." (Bayer, 1952, 51)

- "Originality is important. The mark must be instantly recognizable as different from all the others." (Alden, 1960, F12)

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- “The more distinctive your trademark is, the more value it has for your company.” (Knapp, 1963, 103)
- “To avoid confusion a symbol should be as different from all others as possible.” (Smart, 1982, 124)
- “One of the key functions of a trademark or logo is to *identify* a particular product, service, or company. It follows, therefore, that the trademark or logo should be distinctive...it is important to seek distinctiveness in trademarks and logos.” (Murphy and Rowe, 1988, 15, italics in original)
- “The reality is that most firms and products are fairly similar...When products and services are difficult to differentiate, a *symbol* can be the central element of brand equity, the key differentiating characteristic of a brand,” (Aaker, 1991, 197, italics in original)
- “The effectiveness of a logo depends on: a. distinctiveness...” (Rand, 1991, 11)
- “The basic task of the trademark is to distinguish the communications, the property, and the products of a company: ‘this is us, not anybody else; this is owned by us, not by anybody else; this is manufactured by us, not by anybody else.’ This task implies that the trademark is different from those of its competitors and other companies.” (Mollerup, 1997, 62)
- “‘Having a logo that is just like another company’s is a waste of money…It makes no sense. Business 101 is differentiation. It is the basis for existing.’” (Pamela W. Henderson, quoted in Vranica, 2001, B12)

SYMBOLIC ISOMORPHISM

From its inception, however, there were weaknesses evident in this definition of logos as unique and differentiating. Since at least the early 1960’s, criticism of imitative trends in logo design has been common in the business and design worlds (Campbell 1967; Wolfe 1972; Olins 1978). Anecdotal evidence suggests that logos, especially those within the same industries, do often resemble one another, and often seem to follow established norms of design particular to those industries. This process is referred to as “symbolic isomorphism” by Glynn and Abzug (2002). While the cardinal rule of trademark design is to differentiate, many marks have clearly imitated the marks of more well-known organizations. This was not necessarily due to lack of imagination or talent or other elements of “bad design,” but, I argue, because adherence to norms can help a trademark provide legitimacy, while breaking them may lead to a perception of illegitimacy.

Consider a case involving the trademarks of sports organizations. In 1968, Major League Baseball created a new logo to be used in conjunction with the celebration of the centennial of professional baseball the following year (Figure 1). The logo featured a white silhouette of a baseball batter inside a rectangle and bordered by a blue field on the left and a red field on the right.

Figure 1 Major League Baseball logo, 1968

The next year, the National Basketball Association introduced a new logo that was quite similar (Figure 2). NBA Commissioner Walter Kennedy wanted the logo to “relate” to the baseball mark (Slovinsky, 2006). At the time, baseball was still the undisputed “national pastime,” the most

popular spectator sport in the country, while the NBA enjoyed considerably less national appeal. This fact is underscored by the presence of the identifying “NBA” initials within that organization’s mark, while baseball, as a more “taken for granted” element of American society, felt no need to specifically identify itself within its mark. The NBA’s mimicry of the Major League Baseball logo can certainly be seen as an attempt by a lesser-known organization to gain legitimacy by presenting an image that is similar to a better-known organization.

Figure 2 National Basketball Association logo, 1969

Owing to their association with two of the primary professional sports leagues in the United States, the two marks became highly recognized graphic element of the American commercial landscape. Soon, many more sports organizations were imitating them in their own logos (Figure 3). It became apparent that any nascent sports organization could attempt to gain an air of legitimacy by adopting a logo that adhered to the design conventions that the MLB and NBA marks had begun to establish.

Figure 3 Sports organization logos using the graphic conventions of the MLB and NBA logos

This anecdote suggests the existence of patterns and norms in logo design and selection by organizations that run counter to the conventional wisdom of the field. While the cardinal rule of trademark design is to differentiate, these many marks have clearly imitated the marks of more well-known organizations in a bid for legitimacy of their own.

A QUANTITATIVE APPROACH

We may move beyond anecdotal evidence to investigate the extent to which logos within fields are similar to or different from one another by analyzing data from the United States Patent and Trademark Office (USPTO). The USPTO maintains records of registered trademarks dating back to 1884. In 1983, as part of its effort to automate its operations, the USPTO created a computerized trademark library catalog system. In order to simplify searching of trademarks with graphical design elements (logos), the USPTO included the "design search code" as a feature of this catalog system. The design search code is a numerical classification index through which six-digit codes are assigned to trademarks containing design elements. A mark may be assigned multiple design search codes as needed. So, for example, the logo of the Humane Society (Figure 4) is given the following six codes:

Figure 4 Humane Society Logo

02.11.07	Hands, fingers, imprints of hands or fingers, arms
03.01.08	Dogs
03.01.04	Domestic cats
03.05.01	Horses
03.19.03	Porpoises, dolphins
26.01.08	Letters, numerals, or punctuation forming or bordering the perimeter of a circle

The design search code used by the USPTO is based on the Vienna Classification, created in 1973 as part of the Vienna Agreement Establishing an International Classification of the Figurative Elements of Marks.

In addition to the design search code, trademarks in the USPTO dataset are coded along 34 other search fields, including serial number, filing date, live/dead (whether the mark is actively registered or abandoned, canceled, or expired), and international class (the class or classes assigned to a mark under the Nice Agreement based upon the goods or services on which the mark is used).

Using this data set, the extent to which logos in an industry resemble one another may be examined. According to the conventional wisdom of logo design, marks in the same industry should be different from one another in order to differentiate themselves. Similarity within a group of logo designs is measured using a Herfindahl index, a measure that is the sum of the squares of the "market shares" of all the members of a group. In this case, the group is the logos within a particular industry, the members are the design search codes that are assigned by the USPTO to represent those logos, and the "market share" is the percentage that a given design search code is used within those members. The higher the Herfindahl value within an industry, the more "concentrated" the logo designs within it; i.e., the more they resemble one another. The lower the

Herfindahl value within an industry, the more diversity within its logos; i.e., the less they resemble one another.

Analyzing the dataset of over 1.2 million logos from 1884 through 2011, we find that the average Herfindahl value for the 45 Nice industry categories is 86.54. The Herfindahl value for logos as a whole is 76.72, meaning that the logos of the average industry show more resemblance to one another than do logos in general. Following the prevailing wisdom of logo design explained above, we would expect firms within the same industry to attempt to differentiate themselves from each other in their logo designs; our analysis shows this not to be the case. In fact, the logos of 31 of the 45 Nice industries are more concentrated than are logos as a whole.

These findings suggest that there may be norms of logo design within particular industries, and that companies follow these norms in order to create logos that will be seen as legitimate within their field.

"DEVIANT" LOGOS

But not every trademark conforms to the prevailing norms of design of its time and industry; in fact, there are many innovative marks that deviate from them. Two such "deviant" logos, Apple Computer's original "Newton" logo and the Lucent Technologies "Innovation Ring" mark, help illustrate the potential positive and negative effects of violating logo design norms.

From its inception, Apple Computer saw itself as an organization that did things differently than others in the computer industry. Emerging from a Silicon Valley garage, Apple promoted an organizational culture that valued individuality and creativity over hierarchy and routine. The name "Apple" itself was simple, organic, and evocative, in stark contrast to the complex and technical appellations favored by competitors. Over time, company founders Steve Jobs and Steve Wozniak attained near-mythic status among computer and technology enthusiasts for their innovative products and company practices. Early in its development, in 1976, Apple turned to its third co-founder, engineer Ronald Wayne, to design a company logo (Linzmayer, 1999). Wayne created a highly-detailed drawing depicting the famous scene of Isaac Newton sitting against a tree, his inspirational apple hanging precariously above him (Figure 5). This scene was bounded by not only an elaborately unfurling banner reading "Apple Computer Co.," but a quote from Wordsworth: "Newton…A mind forever voyaging through strange seas of thought…alone."

In the world of mid-1970's simple, abstract logos, this Apple mark was quite an anomaly, particularly within a high-tech industry where companies typically attempted to present an image of technical proficiency through the use of cold, impersonal trademarks (Mendenhall, 1985).

Apple incorporated Wayne's logo on a few of its early operations manuals, but it soon became apparent that the mark was too deviant, even for a company such as Apple. "Jobs eventually came to feel that [Wayne's logo] was too cerebral and not easily reproduced at small sizes," Linzmayer (1999, 6) wrote, "so in April 1977, he instructed Rob Janov, an art director at the Regis McKenna public relations agency, to come up with a better logo." Janov ultimately produced the famous apple mark that is still used, in modified form, today. The Janov logo, featuring a "byte" taken out of the fruit, moved the apple metaphor from the Newton legend into the Garden of Eden and brought Apple into greater compliance with the norms of computer industry trademark design, while retaining a degree of wit and originality befitting the company.

Figure 5 Original Apple Computer "Newton" Logo, 1976

Apple's quick abandonment of Wayne's logo is notable for several reasons. The fact that Wayne, although apparently a skilled illustrator, was, as a trademark designer, an amateur, shows the importance that trademark design as a profession had attained by the mid-1970's. Wayne, as an "outsider" to the profession, showed his ignorance of, or contempt for, its norms in producing a mark that was not only deviant in its technical aspects (i.e., its high level of detail made it difficult to reproduce and read at small sizes, thereby limiting its usefulness) but in terms of its content (Jobs's characterization of the mark as "too cerebral" could be interpreted as a euphemistic way of declaring it "too weird" for the industry at the time). Although Jobs was an intellectual free spirit who attempted to foster creativity within his company, he was also a pragmatic businessman who realized that, in order for Apple to attain legitimacy within the computer field, its image would have to conform to expectations to some degree. His decision to drop Apple's deviant "home-grown" logo and to turn to a professional graphic artist at a public relations firm for a new one is therefore not surprising.

But not every unusual design fails; some eventually prove to be effective by providing differentiation, as was the case with Lucent Technologies' logo. In 1995, telecommunications giant AT&T split itself into three stand-alone companies: a $50 billion telecommunications services firm that would retain the AT&T name; NCR, a computer company; and a $20 billion communications, software, and electronics firm that was nameless.

The new company's management was determined from the outset to establish a distinctive identity, with a particular goal of differentiating itself from its parent company: it wanted to be seen as the "anti-AT&T" (Endlich, 2004, 40). One of the biggest names in the corporate identity business, San Francisco's Landor Associates, was hired to help name and brand the new company. Landor's Patrice Kavanaugh (1997, 22) described her firm's initial assessment of the project: "A review of competitive identities, particularly in the telecom industry, revealed a great opportunity to create a

very distinctive identity for the new company. Most of the competitors possessed identities in shades of blue or gray, with uppercase letters, and little or no symbology. Therefore, by using upper- and lowercase letterforms, symbology, and color, a new identity would easily stand out from the crowd."

Figure 6 Lucent Technologies "Innovation Ring" Logo, 1996

And stand out the logo did: it was a red circle that appeared to have been hand-painted in one quick, sloppy, continuous brush stroke (Figure 6). Lucent called it "The Innovation Ring" and said it "represents the continuous cycle of human creativity," (Lucent Technologies, 1996). Barboza (1996, D9) reported that it was "a hip alternative to AT&T's more classical icon," and that "Lucent executives say it distinguishes their company as bold and innovative." Kavanaugh (1997, 23) declared that its "hand-drawn simplicity evinces and reinforces the personal, emotional appeal of human communication enabled by technology. Taken together, the identity's atypical elements--name, color, and symbol--deliver an unambiguously different, fresh, and more personal message than the precise, harder-edged identities endemic to corporations within and outside the telecommunications and technology arena."

Despite these characterizations of the new logo by Lucent and Landor, its undeniable strangeness drew the scorn, ire, and ridicule of many. As McGinity (2001, 23) put it, "Since [Lucent] was probably the first big example of a blue-chip company taking on an esoteric name, reporters and columnists had a field day over the name selection for months. Especially criticized was Lucent's company logo: a big, red, seemingly handwritten 'O' that got everybody's wise-guy instincts up to the surface. Columns were dedicated to chastising the ugly symbol and the good money spent to come up with it."

Many derisive analogies regarding the logo were drawn, even by those within the company. Some Lucent employees thought it looked like "a red doughnut drawn by a small child, or worse, an advertisement for a paint company," (Endlich, 2004, 43). Lucent's senior vice president of public relations and advertising said, "I hated the logo because it looks like an ink smudge and it's hard to duplicate," (quoted in Endlich, 2004, 43). Journalists were no kinder. Scott and Gillooly (1996) wrote, "At first glance, the logo looks more like a crude type of lifesaver, which might give folks the wrong impression." Others called it "the million-dollar coffee stain," "a big red zero," or "a flaming goose egg," (O'Leary, 1997). McGowan (1997, 36) called it "just a red, splotchy circle." The *New York Observer* asked "Didn't anyone have the temerity to question whether an inflamed zero--red ink!--was the right message they wanted to implant deep in the [consumer's] proverbial brain?" (quoted in O'Leary, 1997). Some thought it more appropriate for a Silicon Valley start-up, rather than a $20 billion company (Barboza, 1996).

The coffee-stain analogy was particularly popular with critics. *America's Network* (1996) speculated that "perhaps AT&T's caffeine-crazed designers were inspired by their coffee-cup rings." The comic strip *Dilbert* took a similar tack, depicting logo creation via coffee cup and satirizing the "Innovation Ring" as the "Brown Ring of Quality."

Because the Lucent logo was so unusual and so difficult to fit into existing categories of understanding, its meaning was open to interpretation. As a consequence, a wide variety of analyses of the logo's deeper significance were put forward. Several of these alluded to the spiritual or religious connotations of the mark.

Graphic designer Mark Fox (1999) wrote that the logo "bears a resemblance to the mythic ouroboros, an image of a self-consuming serpent. Joseph Campbell describes the snake eating its own tail as 'an image of life. Life sheds one generation after another, to be born again'...Although the connection is probably happenstance, the ouroboros is a particularly appropriate symbol for a company born from the restructuring of AT&T," (p. 270).

Weinberg (2000) claimed that in designing the Innovation Ring, Lucent had misappropriated the Zen Buddhist enso, or sumi circle symbol, and he even cited an internal Landor memo that seemed to acknowledge the logo's similarity to Buddhist symbolism. Weinberg objected to the use of a spiritual symbol in this manner, writing, "for most people, the sumi circle will cease to be a symbol of Zen or spirituality or art, but rather the symbol for a telephone manufacturer."

Marrs (1996) saw the Lucent logo as having evil overtones. In implicating Lucent and its parent, AT&T, in his conspiracy theory regarding the use of technology to enslave humanity, Marrs noted that "[t]o occultists, the circle represents their satanic deity, the great and fearsome Solar Serpent. The fiery, red sun, or circle, is his image. Scriptures reveal his as the 'great red dragon'...How interesting that the logo for Lucent Technologies is a *red* circle," (Marrs, 1996, 142, italics in original). He then quoted another author, Des Griffin, who had a similar reaction to Lucent's logo: "One meaning of the red ring is the invincible sun...By those in the know, the light from that sun is understood—in its deep meaning—to represent Lucifer. The name Lucifer signifies light in Latin, as does the word 'Lucent,'" (quoted in Marrs, 1996, 145).

Such an interpretation of a logo is reminiscent of the controversy surrounding Procter and Gamble's "Man in the Moon" logo, which the company had employed in one form or another since 1902. For years, false rumors circulated that the logo contained satanic symbolism. P&G's efforts to dispel such rumors proved fruitless, and eventually the company redesigned the logo and removed it from much of its packaging (Belkin, 1985; Salmans, 1985).

Trademarks that follow established design norms rely on the viewer's familiarity with graphic conventions to convey a sense of legitimacy in the product or organization the trademark represents. "Deviant" trademarks present the viewer with an unfamiliar image, one that requires interpretation or decoding. In attempting to differentiate itself by using a unique trademark, an organization runs the risk of becoming associated with unintended and undesirable meanings.

Despite the ridicule heaped upon the "Innovation Ring" and the alternative interpretations attached to it, the new Lucent logo ultimately succeeded in helping the company to stand out from the crowd in a positive way. To some extent, this success was reflected in the praise the logo received from a wide range of sources. Spaeth (1997, 28) praised Lucent for "hav[ing] the guts to pick...a new symbol so casual and informal as to be unlike any corporate mark seen before" and called the company's unusual image campaign "a deliberate celebration of freedom and self-determination." Branding expert Chuck Pettis said, "It's a logo that works symbolically...One could say it took a lot of bravery for a big company to go forward with that much humanism. I think Lucent has done an excellent job at creating brand name awareness," (quoted in O'Leary, 1997). Lucent's CEO and president were named 1996 Communicators of the Year by Business Week for their involvement in their company's naming and branding (O'Leary, 1997).

Ultimately, it was the old adage that "imitation is the sincerest form of flattery" that best indicated the success of Lucent's risky name and logo selections. While the name "Lucent" confounded

expectations upon its unveiling in 1996, in the ensuing years many companies, particularly those within high-technology industries, began to adopt names featuring an “-nt” suffix. For example, when Hewlett-Packard spun off a new scientific instrument company in 1999, it was named “Agilent.” A company vice president explained, “the ‘nt’ on the end sounds like a technology (to ears) around the world,” (Greenberg, 1999). In fact, the Agilent name was also the product of Landor’s consulting work. “As naming has become professionalized, it’s led to a certain norming standard,” observed brand planner Mark Babej (quoted in Shalit, 1999, 3). “The names have come to sound more and more alike...now we have Lucent. And we have Aquent and Avilant and Agilent and Levilant and Naviant and Telegent.”

Lucent’s distinctive logo, too, was soon imitated by dozens of firms (Figure 7). Gardner (2003) declared that “natural spirals” were one of “fifteen trends taking shape in logo design.” “Imagine a few drops of dark paint dropped into a gallon of white paint, and you stirred them just slightly,” he wrote. “These are the less-contrived vortex or spiral shapes found in nature, not in a computer program. There is a mix of chaos and hard geometry in these marks that suggests order and freedom at the same time.” Two years later, Gardner (2005) wrote that “cave rings” were a logo trend. This time, he explicitly tied the trend to the Lucent logo: “This is an outgrowth of last year's Natural Spirals trend, even though Lucent Technologies has been around a few years now. These designs show controlled chaos, of taking charge of natural and sometimes unpredictable processes. They reveal a human touch applied to computer processes.”

Even the logo’s “Innovation Ring” moniker was imitated: when a new company, Invista, was spun off from DuPont in 2003, it adopted a logo of three misshapen circles and labeled them “the rings of innovation” (Spaeth, 2005). Less than a decade after its creation and subsequent ridicule, Lucent’s deviant trademark had become a trendsetter.

The Apple “Newton” logo and Lucent’s “Innovation Ring” might well be considered “deviant,” in that they depart from the prevailing norms of logo design. What is the effect of adopting such an innovative, or deviant, logo? Two possible answers present themselves: by standing out from the taken-for-granted clutter of trademarks, such a logo may draw additional attention and therefore become a more effective device for symbolic communication, or the “deviant” mark may confuse, annoy, or even anger viewers by failing to adhere to the expectations they hold regarding the appearance of a logo in a particular industry, resulting in derision or scorn that is transferred onto the organization or product that the symbol represents.

Analysis of USPTO data allows this question to be addressed. All marks filed for registration in the 1990s were coded on whether they contained a “deviant” design search code, which was defined as a code appearing in the logos of its corresponding industrial category for that decade less than 0.01 percent of the time.

The “lifespan” of each mark was calculated based on its date of trademark filing and its date of “death” (due to abandonment, cancellation, or expiration). The lifespan of marks that were still “live” was calculated through 2011. The average lifespan for logos containing “deviant” design elements was 7.96 years, while those without such elements averaged 7.71

Figure 7 Logos imitative of Lucent's "brushstroke" design element

years. Of the "deviant" logos, 21.2 percent survived through 2011, as opposed to 18.0 percent of the "normal" logos.

In short, "deviant" logos seem slightly more likely to survive over time and seem to have a slightly longer lifespan, suggesting that there may be some small advantage to employing a logo design that flaunts convention. However, the differences seen here between deviant and normal logos are so small as to be negligible. As well, there are many factors outside the scope of this study that influence the survival of a trademark. Firms and products may fail for any number of economic reasons having nothing to do with the design of their associated trademarks, taking the marks down with them. Individual marks may be discarded on the whims of executives who are unconcerned with their design characteristics. It should also be noted that the survival of a mark should not necessarily be taken as an indication of the effectiveness or aesthetic quality of that mark. Poorly designed, unappealing, and ineffective marks may remain in use while well-executed, attractive marks are abandoned.

Unfortunately, it is difficult to draw any conclusive findings about logo design strategy from this analysis. At minimum, though, I believe that this work calls into question the accepted wisdom that logo design serves primarily to differentiate. We have seen here that logos within industries tend to resemble one another, and that there does not seem to be any significant advantage in terms of design survival to adopting a logo that goes against design norms. I believe that design practitioners should acknowledge the power of design to convey a sense of legitimacy by adhering to expectations about what a logo in a particular industry "should" look like, even though this sort of function is nowhere near as "sexy" as the differentiative one long espoused. A truly effective logo, in my opinion, is one that can both differentiate and legitimate.

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Chung, KS (2012). *User Value Design and Evolution towards Common Value Design.*

USER VALUE DESIGN AND EVOLUTION TOWARDS COMMON VALUE DESIGN

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Abstract: This paper presents a design process that is based on and aims to maximize user values. Values that users perceive important are the business objective and design requirements in this paper. User value spans a range which extends from 'material and physical values' to 'immaterial and soft values' related to emotional and psychological values. User values can be divided into 3 groups: functional values, emotional/affective values, and psychological values based on users' desires and needs. Psychological values can be further developed into the concept of common value. Common value design is to promote not only the values of stakeholders including users, supplier, and value chain participants, but also to take into account the common value of the public such as a community or the society.

Keywords: User Value Design, User Motivation: Desires &Needs, Common Value Design

INTRODUCTION

The success of a business can be measured by the degree to which it creates values for users and the society. Latest social/cultural trends have been reshaping the behaviors of users and the market. The more individual and intangible factors such as physiological pleasure, self-esteem, relation, and empathy are becoming more significant while a diminishing weight being attributed to convenience and fashion (IST Workshop Paper, 2007. The increased focus on empathy and relation can be interpreted as an indicator of the need for greater emphasis on intangible 'soft value', namely, emotional psychological values. The future thrust in product design can be seen in the direction of increasing product 'softness', by engaging user 'emotional and psychological' desires. Designer needs to satisfy users' desire to relate, engage, participate, express themselves, and to be connected or networked, either in the virtual space or in the off-line space.

User perceived values are correlative to human motivation: desire and need. Aestheticians asserted that user's desire has dominant effects in experience. Human desire spans a vast spectrum which extends from 'material or hard' desires, linked to instinctual, physiological, physical elements to 'immaterial or soft' desires relating to emotional and psychological factors. Users' 'desire' creates a market for products, and influence the properties, and characteristics of products. Furthermore, users' desire and need determine how much users are willing to pay the price at the moment of exchange.

S. Boztepe reported an extensive summary of value definition, property, and type in 2007. In the paper, Boztepe defined value as exchange, value as sign, and value as experience. In this paper, values that users perceive important are considered as the business objective and design

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requirements. It is designer's creativity to understand and identify what constitutes user perceived values, qualitatively and quantitatively.

Mankind's ' 'desire, need and will' are the driving force behind the advancement of civilization. Unrestrained 'desire and will', however, have been the roots of calamities facing mankind. Many current social issues are partially due to the excessive desires or greed by individuals or by reference groups. Users' psychological or spiritual values that are beyond individuals' ego can be further developed into the concept of a common value design. The key of the common value design is to promote not only a symbiotic relationship among key value stakeholders such as users, designer/supplier or value chain participants, but also to take into account the common value of many and unspecified persons such as a community or the society in general. In a mature market or in the society, the implementation of spiritual/psychological values in product/business design can increase the value of not only stakeholders but also the common value of the public or the society as a whole.

USER COGNITION OF VALUES

COGNITIVE FACULTIES AFFECTING USER VALUE

In product or business design, it is important to understand how and by what users are motivated to perceive, feel, sense, experience, judge, value, and finally react. An object can be sensed, felt, perceived, and experienced in terms of its quality, quantity, modality, relation, attribute, or features. Users' experience of objects can be sensory, emotional and intellectual or all at once.

According to Western philosophy (T. Aquinas, Hume, and Kant), the fundamental building blocks of cognitions are: sensibility and logical cognition. Logical cognition is through reason, while sensibility is based on sensation/perception. The sensibility supplies the perceptions or intuitions with information (or feels, impressions), garnered from external phenomena through five external senses (or primary senses), and then there is the understanding (cognition/perception), which produces judgments of these intuitions. The understanding through reason is referred as 'cognition by internal sense'. Thus, the faculty of human understanding can be divided into two categories: cognition through reason (logics, knowledge), and sensibility (understanding via feelings and emotions). Judgment by reason or rationality can result in various forms of virtues: i.e., seven chief virtues (4 cardinal virtues of prudence, justice, temperance, and fortitude, from Greek philosophy) and the 3 theological virtues of faith, hope, and charity.

In Asian philosophy, human nature is asserted comprised of two elements: reason and energy/disposition (or temperament). Reason is defined as universal and necessary principles or knowledge, without which noting can exist and function. Energy/disposition facilitates cognition and sensibility. Energy/disposition reacts to sensory experiences, and generates 7 types of emotions: (joy, anger, sorrow, pleasure, love, hatred, fear). Disposition and emotions are genetically determined and of biological nature. There are 4 types of virtues (compassion, righteousness, humility, and wisdom) linked to reason.

In both Western and Eastern philosophy, the mechanism for understanding and perception is similar: sensibility & cognition by reason. The remaining question is how desires intervene in cognitive process. In philosophy and aesthetics, 'desire' is believed to have dominant effects in experience and understanding. Desire, similar to 'passion or will' motivates, energizes, directs, sustains, compromises, and sometimes controls human behavior, attitude, experience, judgment, and cognition. Human motivations span a wide spectrum of causes for behaviors, starting from physiological and instinctual to spiritual and psychological ones. At the physiological and instinctual end of the motivation spectrum, desires and needs, react to external stimuli with little emotional or psychological inference. When external objects or stimuli are sensed by primary five senses, the immediate response could be physiological or instinctual. In other words, we do not reason or be emotional to conclude that we are hungry, thirsty, or in danger, but rather "sense or feel" that we are.

Asian philosophy asserted that there are five types of desires (material/wealth, fame, food, rest/sleep, and sex). However, there could be more instinctual desires such as the instinct for preservation of the species, or instinct for physical safety, as well as metaphysical desires for free will, ethics, and religion at the other end of the spectrum of human motivation.

These three elements of cogitative capacities: Cognition by reason, and Sensibility by emotion, and Desire/will affect judgment, experience, attitude, behaviors, and value. Figure 1 shows the elements for human understanding and perception.

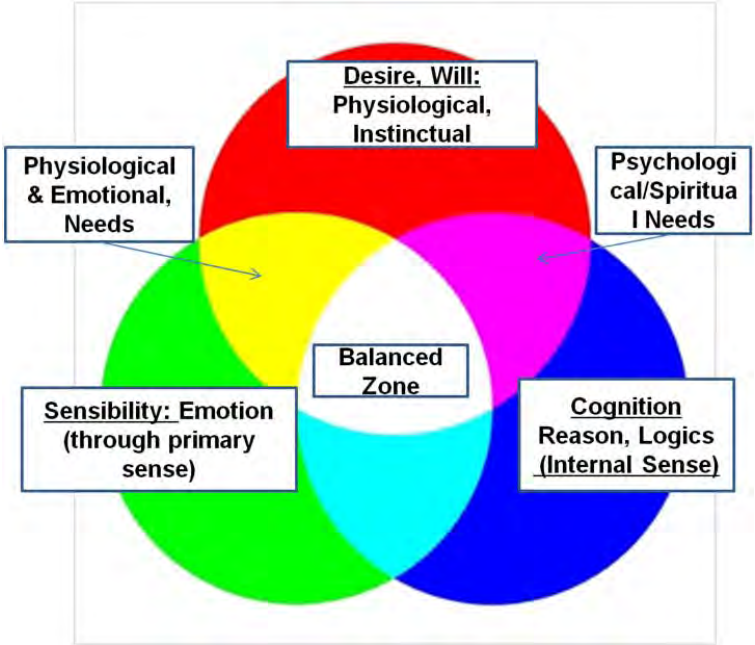

Figure 1: Capacities for Perception/Sensibility/Cognition

The understanding of cognitive faculties sheds light on how users experience, judge, value, and behave, for a well balanced and mature society or individuals, all three cognitive capacities are interacting synergistically and are in harmony and balance with each other as marked 'balanced zone' in Figure 1.

DEFINITION OF USER VALUES

Product experience can be reducible to the value of products. With the shift of user desire towards 'soft and intangible' elements, the intangible and philosophical quality of an object can be best expressed by value. The design strategy and methodology based on material and function may not be appropriate to address the emotional and spiritual aspect of design. As an example, for burgeoning new media services such as Facebook or Twitter, function related values of these services are outweighed by emotional or affective values. For most service or business design, design approaches based on values can be much more effective in representing the total benefits perceived by users.

For products to be properly perceived, felt, sensed, experienced, judged, and valued by users, design of products should appeal to three cognitive elements: desire, reason, and emotion. Three cognitive capacities balance, control, overrule, stimulate, and sometimes dominate each other. Desire, influenced by disposition/emotion, generates various types of 'wants and needs'. Desire, restrained or rationalized by reason/rationality, yields 'virtuous, spiritual and ethical' needs.

Maslow (1943, 1971, and1998) and Alderfer (1972) posited a hierarchy of human needs by synthesizing a large body of research related to motivation for behaviours. Maslow's needs are based on two groupings: deficiency needs and growth needs. Maslow's needs span a wide range

of ‘wants and needs’ from physiological and instinctual desires such as food, rest, safety, sex to spiritual and transcendental needs in a total of 8 level needs.

Values are realized by satisfying users’ desires and needs, by offering experiences. In this paper, user perceived values are divided into three categories: 1.) Values related to material, physical, physiological, instinctual, functional desires and needs. 2.) Emotional/affective values related to sensibility. 3.) Spiritual and psychological values based on reason/rationality. Table 1 summarizes the list of user values based on human motivations: desires & needs.

Table 1: User Value Types based Desires

Desires/Needs	Value Property	Value Variables
Spiritual, Psychological Needs (by Reason)	Compassion, Justice, Humility, Wisdom, prudence, temperance, fortitude	Virtuous,, Ethical, Moral, Spontaneity, Altruistic Values
Emotional, Affective Needs (through Sensibility)	Joy, Anger, Sorrow, Pleasure, Love, hatred, Fear	Fame, Self– Esteem Intellect Belongings, Loved Aesthetic Entertainment/Hedonic
Instinctual, Physical Needs (by Sensory contact)	Material, Physiological, Functional	Safety/Quality/Reliability Benefits Values Function, Operational, Convenience

EVOLUTION OF VALUE DESIGN TOWARDS COMMON VALUE DESIGN

The focus of design has been moving on from ‘goods’ to ‘service’, and to the ‘relational design’ [Andrew Blauvelt 2008, Kenya Hara 2010]. This is a response to the social/cultural changes with the advent of Web2.0 [Bourriaud 2008, Rifkin 2010]. The increased focus by users on individual taste and intangible value has caused the shift from a goods based economy to a service-based economy. Relational design can be defined as "a set of design practices which take the whole of human relations and their social context, rather than an independent and private space” following the concept of relational aesthetics [Bourriaud 1998].

In relational design, users are envisaged as a community. Relational design sets up situations in which users are addressed as a collective, interacting social entity. The relationships between users and designer should move forwards to the state of empathy, and its ability to facilitate social interactions within a greater whole, as a dynamic system (i.e., community or society). Also, the designer side needs be considered as a community that includes the supplier, value chain, supply chain participants and outsourcing partners.

Due to the changing social/cultural/technological trends and user behaviors, the trends of design are also shifting. If ‘form follows function’ in the era of Modernism and mass-production, the current trend in design is relationally-based in the social or community context, and ‘form follows empathy and relation’. Relation design is to add “the dimension of human relationship and its social context’ to design.

Relational design can be further developed into the concept of common value design. Common value design is an extension of user value design by appealing to users’ spiritual and psychological values in the social context. A desirable business strategy for corporations or the society is seeking the common value of the community, eventually maximizing the value of key stakeholders, customers and supplier. The maturity and stability of the society may be measured by the degree to which the common values are promoted and created.

VALUE DESIGN SPACE AND VALUE VARIABLES

To analytically approach complex business design problems, this paper introduces the concept of a value design space. A value design space is any portion of the universe isolated for the purpose of investigating the value creating activities within it. Figure 2 depicts a value design space that subsumes all value variables. Key groups are User, Supplier (on value chain), Micro- and Macro-environment factors, Public factor, and Designer in the form of design thinking.

The environment factors of Figure 2 are only a sample list of environment factors. Depending on products, and markets, the list should be accordingly modified.

The public factor represents many and unspecified persons including the public or the society in general, which are not directly involved in offering and consumption of the object product. The public is usually considered as part of macro-environment factors. However, in this paper, the public factor is treated separately to emphasize the importance of common values associated with the public or the society.

The value chain is a conceptual network that links up all value adding activities during the course of production/delivery/consumption of products. Players over the value chain exist within the same organization or outside of designer's organization. Typical value contributing activities include Outsourcing, R&D, Producing, Marketing, Sales, Logistics, and Services.

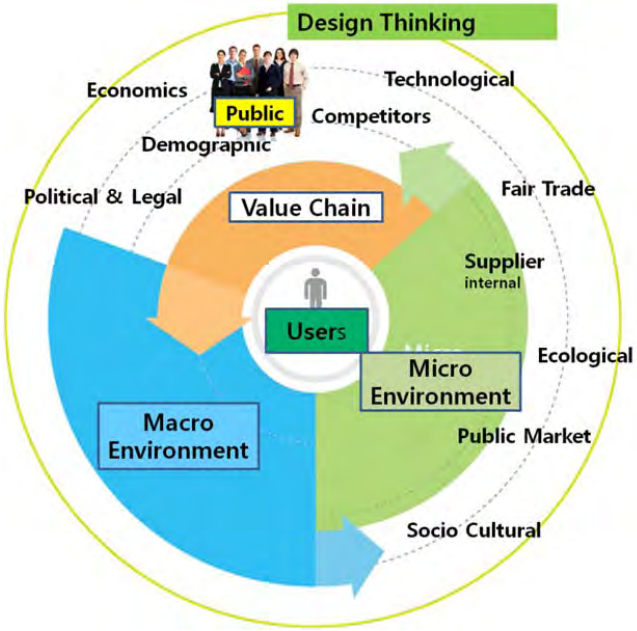

Figure 2" Value Design Space

Designer, in the form of design thinking, being located at the outer circle of the business space of Figure 2, optimizes the whole of the design value space that entails user community, supplier community, environment factors, and the public. Business designers are generally imposed with numerous constraints and boundary conditions such as limited resources, social, ecological, economical, and global factors. Designer's creativity and innovation is to negotiate trade-offs among diverse business constraints and variables, and to come up with a solution that is quite different and substantially upgraded from the existing solution.

There have been many proposals and discussions as to how design thinking puts into effect [Brown 2010, Martin 2010, Walters 2011]. In the end, however, discussions converge to the notion that design thinking is basically a methodology for practical, creative resolution of problems. Design thinking is a form of problem solving approaches that start with the goal definition. Some of key attributes of design thinking from preceding researches are: Process, Strategy, Multi-disciplinary, Holistic, Customer-centred, Analysis, Synthesis, Convergence and Group-thinking.

Design thinking is generally considered the ability to combine logics, empathy, creativity, and intellect to analyze problems and find solutions. Key logics developed for generations by thinkers and philosophers are deductive, inductive, dialectic, and abductive logics. Logics are to gain new knowledge, and find solutions for problems, based on premises. Premises are statements believed to be true, based on experiences or knowledge. Logics are useful for making an "educated guess, an inductive leap or the stretch of imagination". A dialectic approach, particularly the synthetic stage of dialectics, can be effective in group thinking or in the critical review environment.

Similar to any physical or social problem, a complex design system is time-dependent. Time variables are: 1.) Product target time representing styles (contemporary, retro, or futuristic). 2) Realization time or the product launching time. 3.) Life Cycle of design product:

As an active value contributor and consumer, users play a leading role in defining what kind of values are desired and needed by business. User values are equivalent to un-negotiable business design objectives and requirements.

All value affecting or contributing variables such as environment variables, designer factors are similar to boundary conditions, which are negotiable constraints. Table 2 summarizes user perceived values, and all value affecting factor. It should be noted that depending on the design object, the contents of Table 2 should be modified accordingly.

Table 2: Value Variables in Value Design Space

Value Groups	**Value Parameters**
User Value: (Functional, Emotional, Psychological)	Spiritual/Moral/Ethical Values
	Self-Fulfillment/Spontaneity
	Fame, Self-Esteem
	Intellect
	Belongings/Empathetic/Being Recognized
	Aesthetic
	Entertainment /Hedonic
	Quality/Safety
	Benefits (Economic, Post-benefits)
	Functional (Operational, UX)
Design Thinking Values	Creativity
	Innovation
	Intellect
	Group Thinking (Synthetic Dialectics)
	Transformational
Environmental Value Factors	Macro Environment Factors
	Micro Environment Factors
	Value Chain Contributors
	Time Factors: Styles, Realization time, Life-Cycle, Life.
Common Value	Mutualistic value, Community Contributing Values

VALUE DESIGN CASES: QUALITATIVE DISCUSSION

Design is essentially an optimization of the ways in which a design system and design variables may be arranged and configured to the maximum values (utility) of users and the community. Relation design is to optimize the value space of Figure 2 as a whole, instead of optimizing the values of a few groups directly involved in the object business. The optimization takes the iterated process of inference and analysis similar to any analytical approaches for physical and social problems. The inference phase consists of selecting the most influential design variables based on

the available data or designers' experience, intuition and creativity; whereas the inquiry phase consists of using what is known about the design models to scrutinize & optimize the relevant design variables. Optimizing inquiry involves searching the parameterized space of experience or related information and data to select the variables that promises to be maximally valuable to the value design space..

It is important to identify the values that users perceive important from the user values of Table 2. If a goods and service can satisfy at least one or two user value items in Table 2, it may guarantee a success. Good examples are Facebook and Twitter, which do not offer any material or very limited functional values, but enjoy a great commercial success by satisfying users' desires for 'Belongings/Empathetic/Being recognized'. Some people can even sacrifice their lives for what they belong to. Also, Wikipedia, by providing values related to intellect/knowledge, is also gaining a great deal of attention.

There could be a plenty of samples for the social/value design in business. A sample case is the case of an Industrial Bank that has a considerable success (landed new accounts of $100M in a month) by hiring a fatherly figure who appeals to potential customers emphasizing the industrial bank's role of supporting small and medium business for creating more jobs. This approach has appealed to potential customers' social or civic consciousness under the current economic environment. Another example is that a global automobile company has made a substantial financial contribution to a world-famous opera house in Europe. The customers of the automobile company could experience psychological values, recognizing the connection between the donation to the opera house and the car that they own.

As a practical design problem, let's consider Smartphone for the year 2030 market. As the market for a product matures, the weight of soft values (immaterial emotional and psychological) is increasing whereas the weight of hard values (material, hardware oriented functional values) may remain stagnant. By the year 2030, the Smartphone industry may become fully matured. We can expect that the merits by technology, quality, efficiency, and functionalities (such as telephony, and multi-media handling capacities) among products may be difficult to differentiate. As a result, product design will be geared towards the enhancement of emotional and psychological values such as intellect, entertainment, aesthetics features as summarized in Table 3.

To satisfy users' emotional/affective desires, convergence of various values may be needed. Smartphone can perform multi-functions that have been handled by many different types of equipment. PC, TV, Game box, Video/camera, Knowledge box, Health-check equipment, and Phone can converge to Smartphone. To provide seamless and integrated values to users, convergence within or across the boundary of the supplier community are also taking place. Contents Providers (CPs such as Google, Microsoft, and Yahoo), Network Operators (NOs such as Vodafone, AT&T), and Smartphone manufactures are closely cooperating or they can become one company through M&A. On the other hand, Apple's major competitors may not be Smartphone manufacturers. Rather, competition may come from NOs or CPs who may wish to control the brain and heart of Smartphone similar to the PC industry of these days.

In 2030, Smartphone can be getting smarter, and all of health-diagnostic, entertainment, knowledge, networking, and aesthetic tools can converge to Smartphone equipped with high powered computing capabilities. Another possibility is that the Smartphone can become a dummy box, and all of the above functions are moved to the central location controlled by NOs or CPs. Users will choose desired features and functionalities externally by downloading. In either case, Smartphone should be able to satisfy users' desires for a universal, ubiquitous, and all purpose-device that can satisfy most of users needs for daily lives. The control of the operating system (brain) of Smartphone will be the battle ground for NOs, CPs, manufacturers because of its high value-added potentials.

Some of the values expected on Smartphone are summarized in Table 3.

Table 3: 2030 Smartphone Model

Value Groups	Design Requirements /Variables
Virtuous/Spiritual Values	Energy/Ecology Values
	Social/Community Contribution
	Social App
Emotional/Affective Values	Custom built
	High Valued Accessory
	Business Box
	E. Money/Financial Box
	Aesthetical, Fashion, Special Material
	Health Device
	Education Box (eBook, e-learning)
	Knowledge Box (Surfing, Dictionary, Encyclopaedia)
	Art Creation Box (DSLR, Video/Camera, Music keyboard)
	Entertainment BOX (music, video, game)
Functional/Material Values	Carrier Transparency
	Hardware Independence (Multi-function Box)

Figure 4 shows qualitatively the value structure of a product. In this Figure, the lower bottom represents values from satisfying functional or safety needs. The next level shows emotional and affective values, and the top of the value hierarchy describes psychological/spiritual values.

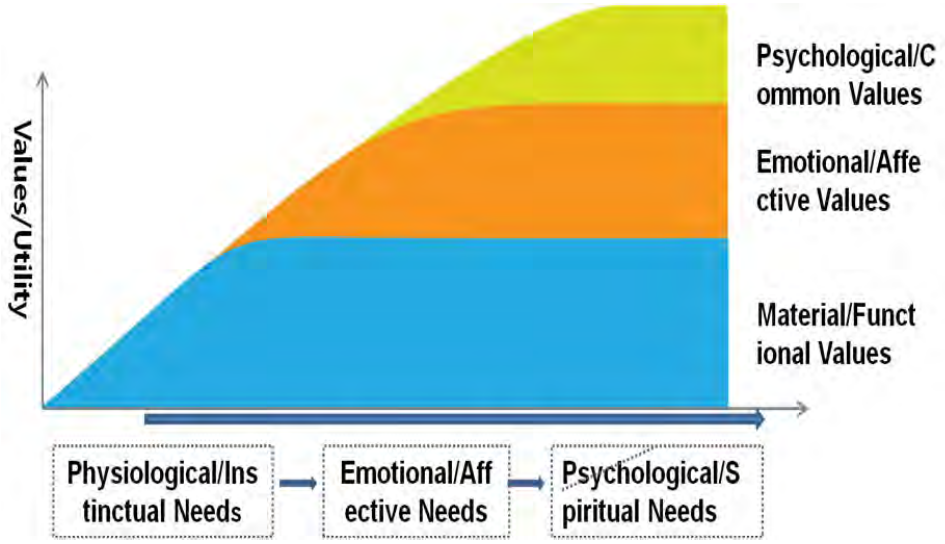

Figure 4: Design Values versus User Needs

Figure 4 shows several key attributes of user values. As the market for a product matures, the weight of intangible soft values (emotional, psychological) is increasing compared with 'hard' values (material, functional values). User value follows the marginal utility concept. The marginal utility concept is that once a certain level of needs is satisfied, the rate of user value by additional satisfaction of the same need increases at a slower pace. Another attribute is that the material, functional value needs be satisfied before moving to the next level of values. This hypothesis may not be always true, depending on the types of products and services, as well as individual preference. The third attribute of the value is that to enhance the value of products or a business, value based on one value category has the limit. Designer should appeal to users' various types of

desires, and offer matching value experiences. For a given business or product, management of the value portfolio is important. It is interesting to note that Google is expanding the portfolio of values offered to users by including GIS, multimedia, and communication services.

All beings, whether material or immaterial, and tangible or intangible can be the source of values to users. It is the designer's creativity and intuition to identify the values that users perceive important

CONCLUSIONS

Design is a process of converting and optimizing the uncertainties arising from the changing environments such as the spirit of the age, culture, market, and technology into the useful and definite values. Due to the shift of social/cultural/technology trends, user value is shifting from the values related to material and function to the more intangible, 'soft' dimensions of emotional and psychological values. The changing market and users behaviours call for a new design strategy focused on 'soft values'.

From the latter part of the last century, the diversity, and complexity of design objects have increase rapidly. Because of its expanded target and role, the design function should assume more serious responsibility. Designer's role should pay attention to social aspects of products and business by taking the whole of human relations and their social context, rather than an independent and private space.

The boundary between users' cognitive elements (desire, emotion, and reason) may not be apparent because of the complexity of human nature. However, as the society or the user community become mature, an equilibrium state of emotion-desire-reason could be increasingly important. It is important to understand the 'desires and needs' of users as well as the society in general.

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Lam, B., Wang, S., and Holland, R. (2012). *A Sensitizing Tool for Smart Home Developers.*

A SENSITIZING TOOL FOR SMART HOME DEVELOPERS

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Smart home concepts targeting older adults have been significantly increased due to the ageing population trend. However, developers have been struggling to turn concepts into reality due to the lack of understanding of older adults. Therefore, this research aims to develop a user-oriented design research tool that could improve the understanding of home lives of older adults. The project investigated the latest generation of design ethnography and examined the possibility of using this approach as a mean to sensitize developers to older adults' needs and create user empathy. The new tool combined the richness of Cultural Probes with the rigorous coding process. By presenting extracted issues alongside users' stories, the results are considered grounded, real and inspiring. It helps challenge the preconception of older adults, which lead to innovative ideas.

Keywords: Design Ethnography; User Empathy; User Research

INTRODUCTION

The *'smart home'* is a vision closely associated with computing and information technology for the home (Harper, 2003). In many cases, the term *'smart'* refers to the character of a technologically networked environment capable of sensing, responding and reacting to the habitants' everyday needs through personalized assistances and services.

Even though the idea dated back to the 1980s, experts observed that there has been limited progress toward turning concepts into reality. Without practical applications, smart home developments cannot complete the innovation process and fulfill their potential. One of the main problems is the technology-push approach. Most developments (e.g. 'Smart Home Project' by Samsung and 'MS Home' by Microsoft) focus on technological features of the home (Taylor *et al*, 2007) rather than addressing psychological and social needs of inhabitants and their relatives (Hughes *et al*, 2004). Moreover, there has been limited input from the housing sector. In order to deliver a truly smart home, it is important to understand users. Unless perceived values are higher than costs, it is hard to gain user acceptance.

RESEARCH SCOPE

Recently, there have been several smart home concepts developed for older adults (aged 50+) as a means to enhance their independence. Older adults are considered an interesting group due to the large market size, relatively high disposable incomes and significant needs for assistive technologies. Despite extensive research on physical needs of older adults (e.g. accessibility), emotional needs, especially their relationships with their homes, were hardly explored. Hence, this project focused on smart home developments for older adults.

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The aim was to develop a user-oriented design research tool that could improve the understanding of home lives of older adults in the UK.

BACKGROUND RESEARCH

The research began by exploring emerging design research frameworks that could provide a basis for the development of a sensitizing tool. Subsequently, design ethnography, which excels in gaining in-depth understanding of users, was identified as a suitable framework to be investigated further. Hence, the evolution of design ethnography was reviewed and categorized into three phases based on Hanington's (2003) framework: Adoption (Ethnography for Design), Adaptive (Ethnography in Design) and Innovative (Ethnography through Design). While the first phase is characterized by the use of ethnographic techniques to gain insightful understanding in order to inform design decisions, the second phase sees the better integration of ethnographic studies and the design process.

In the third phase, ethnographic research is described as 'play of possibilities' (Anderson, 1994). The purpose is to use design as a means to uncover needs that may be unknown, even to the user. One major methodical development in the third phase is 'Cultural Probes' (Gaver, Dunne and Pacenti, 1999), which empowers participants to co-create new knowledge with researchers. This approach demonstrates a shift in design research from user-centered study (user-as-subject) to co-creation (user-as-partner) – see Table 1 below.

Table 1 Three phases of ethnography in design

	Adoption	Adaption	Innovative
Purpose	Knowledge retrieval	Knowledge production	Participation and reflection
Focus	Product and system in the context of use	Users' needs	Users' needs and designer/researcher' participation
Key benefit	Sensitizing designers	Encourage divergent thinking	Open up new space for design and critical thinking
Position	Ethnography for design	Ethnography in design (process)	Ethnography through design
Examples	• The importance of homes in technology research (Hindus, 1999) • Designing for a home of the future (Intille, 2002) • Lesson learned from an adaptive home (Mozer, 2005)	• Unremarkable computing (Tolmie *et al*, 2002) • Information probe (Crabtree, Hemmings and Rodden, 2003)	• Cultural probes (Gaver, Dunne and Pacenti, 1999) • Empathy probe (Mattelmäki and Battarbee, 2002) • Reflective design (Sengers, Boehner, David and Kaye, 2005)

In this case, researchers play a center role in provoking and opening dialogues regarding design directions. Carefully designed objects, e.g. postcards and diaries, are used as media to trigger ideas and lead the group toward unexpected outcomes. Participants co-create knowledge by giving their reflective thoughts in response to the probes, which are mostly open-ended (e.g. what object most represents your home?) and imaginative (e.g. if you could give your home magical properties, what would it be?). Being inspired by Cultural Probes and subsequent developments (e.g. Domestic Probes), the researcher chose the open-ended user engagement and qualitative research as the main approach of the study.

RESEARCH METHODOLOGY

The data collection and sensitizing tool development were carried out in parallel. To ensure the validity and reliability of the outcomes, the methodological triangulation was employed. Thus, the project employed three different methods (Home Probes, semi-structured interviews and video tours) to investigate the same problem.

Random sampling was used to recruit eighteen suitable participants from diverse backgrounds to take part in all the studies over a period of two weeks.

DATA COLLECTING PROCESS

In this case, Home Probes were designed based on Cultural Probes principles and properly tested through the pilot study. The final probe pack (Figure 1) contained:

- Nine postcards with different probing questions designed to gain insight regarding the definition of 'home', changes in participants' homes and sensory experiences in home environments. The list of all questions and their purposes are explained in Table 2 below.
- A disposable camera with 10 requests, e.g. taking a picture of something beautiful.
- A sensory diary designed to uncover participants' emotional connections and memories related to their homes – participants were asked to record daily sensory experiences, e.g. the best sound they heard in their homes and the smell of their homes.

Table 2 Probing questions and their purposes

Questions	Purposes
1. What is your most comforting thing at home?	To examine the idea of comfort, which is one of the most important issues associated with the home
2. What makes you feel at home?	To identify tangible aspects associated with the feeling of being at home and overall meaning of the home
3. What object most represents your home?	
4. Choose a corner in your home and describe it in detail.	
5. An incident happened in the home?	To investigate users' demands originated from the uncertainty and stressful parts of family / home life
6. How do you see yourself in the future? Describe yourself in three words and, if you can, draw a picture.	To find out the consideration for changes and the influences of these changes in regards to their homes
7. You are a wizard. Imagine you have a magic wand. Now is your chance to give your favorite object a magical property. What would it do?	To encourage imagination and 'wild' ideas regarding their homes
8. If you could give the whole house magical properties, what would it be? Pleas describe the transformed place. If you wish, draw a picture, too.	
9. Describe a memory from your home long ago, as if you are looking at an old photograph of the place	To use a storytelling technique to help users reflect on their experience in relation to their values and future needs

Figure 1 Key elements of Home Probes
Source: Wang, S. (2009)

After participants completed all the activities and returned the probe packs, semi-structured interviews were carried out to clarify and explore written and photographic responses generated from Home Probes further. Finally, the video tours, where participants introduce their homes, were employed to gain in-depth understanding of participants' sensory experiences and memories. Although the research framework was inspired by Cultural Probes proposed by Gaver, Dunne and

Pacenti (1999), this project employed the interviews and video tours in order to probe deeper and triangulate results (Figures 2 - 3).

Figure 2 Cultural Probes process – the process of expression and interpretations

Source: Gaver, B., et al (2004)

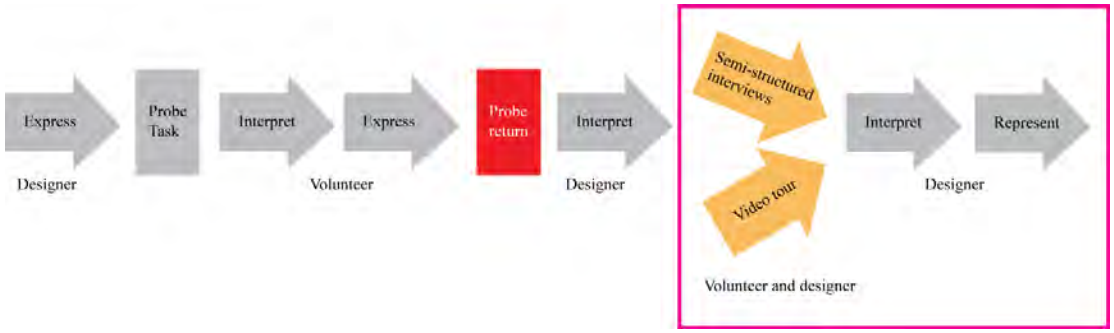

Figure 3 Home Probes process – interviews and video tour are used to crystallize the phenomenon studied

Source: Wang, S. (2009)

METHOD DEVELOPMENT PROCESS

The findings revealed that a networked environment, which is the current focus of smart home developments, is probably the last thing in older adults' minds. Their relationships with homes are rich and very complex (see some examples of raw data in Table 2 and Figure 4).

Table 2 Examples of participants' responses to probing questions

Question No.	Participants	Participants' Responses
1	Caroline	For Caroline, being in touch with nature is the most important thing – *"I love expanses of greens and water… and open sky. I love big spaces."*
2	Paul and Mary	For Paul, a sense of comfort comes from familiar things, such as his collections of miniature items – *"being surrounded by my little oil lamps, my watering cans and my little lawnmowers, it makes me feel at home."*
3	Brenda and Paul	Brenda chose the old grandfather clock that her husband bought as an object that most represents her home even though she disliked it – *"He (Paul) owns this house as much as me… I enjoyed things I like, which he doesn't like. We don't have to like everything, do we?"*
4	Charlotte and Paul	Charlotte chose to the picture of her kitchen because *"it is the social center of the house."*
5	Johannes	Johannes is not emotionally attached to his house. For him, home is *"a very largely overrated concept."* He noted that "*my mother had the tendency to decorate the house and made it look very nostalgic and I don't like it… when she passed away… I removed all the furniture."*
6	Denis	Denis was anxious about his future, especially problems with his knee and legs. Thus, the words he chose to describe his future are *"disable probably, my legs… in the future, my knees, arthritis…"*
7	Angel and Phil	Angel misses her family members who passed away. Thus, she would love to give her family photos a magical property so that people in the photos would become alive *"like the picture frame in the Harry Potter films"*
8	Heinz and Nora	Heinz wants himself to have a magical property. Since he hates commuting, he would like to *"do things like appear in different places."*
9	Brenda and Paul	Brenda lives in a 300-year-old house and is enthusiastic about it period features – *"The original use of the house, they probably use it as a nursery. They used to keep the children right on top of the stair…"*

Figure 4 Pictures of tangible aspects that make people "feel at home"
Source: Wang, S. (2009)

Although it is crucial that smart home developers develop empathy for older adults, it is not practical to expect them to examine all data captured via Home Probes, semi-structured interviews and video tours. There is a need to present the data in a form that suits developers' needs while maintaining its richness. Hence, the data was processed using a computing-assisted analysis of qualitative data (NVivo 8) to identify key issues. 137 issues were extracted, converted into 'idea tags' (Figure 5) and grouped into 10 themes, e.g. 'rules of tribes'. All the research results were integrated to form 'home stories' (Figure 6), which depict personalities of home owners (personas) and their relationships with their homes.

Figure 5 Idea Tags extracted from Home Probes
Source: Wang, S. (2009)

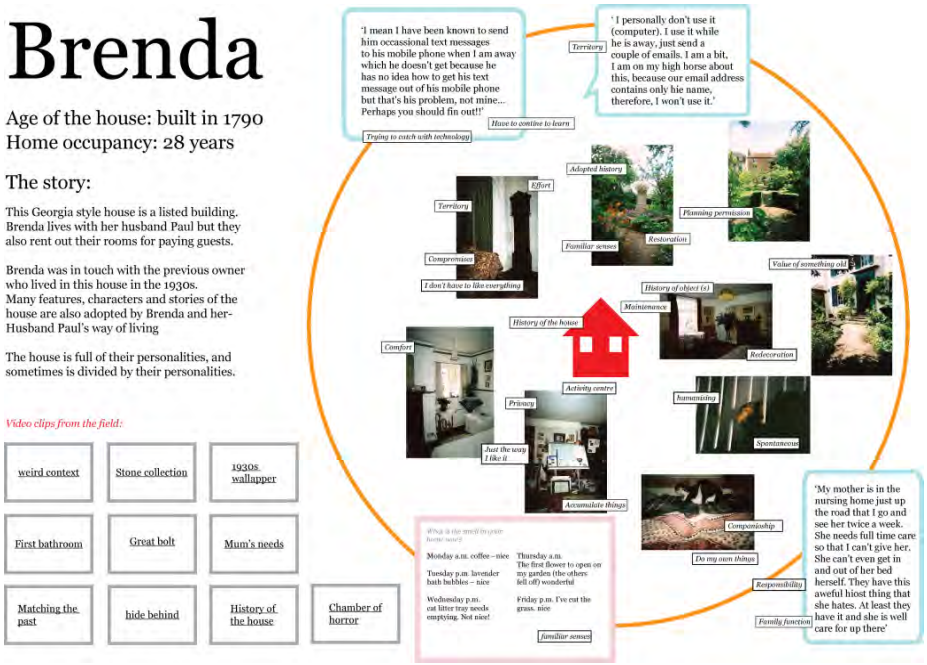

Figure 6 Example of home stories
Source: Wang, S. (2009)

By combining all the ethnographic results, a sensitizing tool (Figure 7) can be achieved. The tool contains rich qualitative data in order to immerse smart home developers in the user world and help them empathize with older adults and their emotional needs.

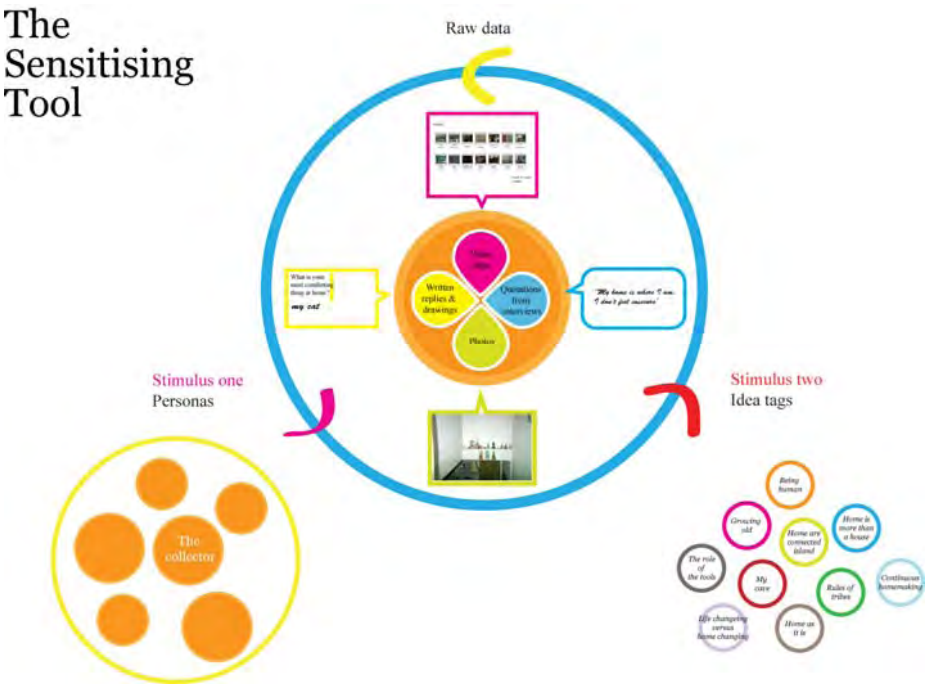

Figure 7 The details of the sensitizing tool
Source: Wang, S. (2009)

EVALUATION PROCESS

The sensitizing tool was validated through a creative workshop with 10 participants representing key disciplines included in smart home development projects e.g. a human factor expert, a medical

doctor and an experienced product designer. The workshop aimed to examine whether these stories could 1) help a potential developer empathize with older adults and their points of view, and 2) provide clear directions for future developments. Participants were asked to read home stories, examine the raw data (e.g. video footages), and map idea tags to form the big idea and strategic directions for a smart home project.

The participants were grouped into two teams. Team one identified *'home is more than a house'* as a key theme. After exploring several idea tags that could differentiate a home from a house, the team agreed that *'territory'* was the most important aspect. This was because people can be themselves and do anything they want in their own spaces. As a result, team one's core vision for smart home developments is enabling people to *"bring homes with them wherever they go."* The potential ideas for smart home developments include using a virtual environment to help people feel at home even though they are away from homes, e.g. stay in hospitals. Team two selected three idea tags as a starting point: *'home is more than a house'*, *'home is where the heart is'* and *'love'*. Team two chose a *'lizard tail'* as a metaphor for their core vision. In this case, the broken tail is referred to flexible interfaces of the smart home that can be adapted to the needs of different generations. The body of the lizard symbolized the shared value of *'love'* and the facilitator of communication.

It was observed that the sensitizing tool played an important role in provoking lively discussions about the meaning of 'home' and helped workshop participants explore smart home visions and concepts from users' perspectives. The ideas developed at the workshop are significantly different from existing smart home concepts, since the participants began with users' relationships with their homes. Interestingly, the discussions were hardly about address users' needs, but what home and its tangible aspects might mean to users.

EVALUATION RESULTS

Post-experience structured interviews were conducted with all the participants to assess the effectiveness of the tool and evaluate their experience. A feedback session with the participants was conducted after the workshop to evaluate the sensitizing process and the stimuli presented. The session used both open-ended (e.g. what was most useful for creating ideas?) and ranking questions (e.g. if you have changed your perceptions towards the older users, please rate the change in a scale 1 – 7 where 7 = totally change my perception) to evaluate the content, the structure and the effectiveness of the workshop. All feedback was considered positive. The feedback suggested that ethnographic research triggered design ideas and helped to open up the problem solving frame of mind.

> *Keywords and the combination of other content helps to trigger freedom to make a connection with the phenomenon gathered from the study rather than the ''this is the problem'' approach* (participant H)

The home stories connected developers to users at the personal level which helped develop empathetic views towards older adults and respect for their ways of life.

> *When we listen to the stories, it reminded us of our own lives and how we live. I realized we are, after all, not that different from them (older adults)* (participant A)

Most participants found the tool effective and the whole experience very immersive and appreciated the raw data and the richness of the stories. They found the idea tags to be helpful in providing the links to the original data. It allowed the team to develop a shared understanding about the ideas and the value of the ethnographic research.

> *This helps me to understand the design process better and the other team members' thought processes and contributes towards it* (participant L)

POTENTIAL APPLICATIONS

The evaluation showed that the sensitizing tool can help developers immerse themselves into the world of potential users. It is observed that it will be useful for ideation at the front end of the innovation process. Although, this tool was developed for smart home developers, it could be generalized to support other industries where user empathy and immersive experiences are required. Three potential applications of the tools are listed below.

FOR THE FRONT END OF THE INNOVATION PROCESS

Similar to a traditional adoptive approach to ethnographic research, the sensitizing tool could help capture information, as well as inspiration provided by users. Applying this tool in the front-end stage of the innovation development process could help developers challenge the existing perception of users and gain deep understanding about their needs and aspirations.

FOR THE NEW PRODUCT DEVELOPMENT PROCESS

The tool encourages divergent thinking, which is crucial for the design development stage. It can be seen as a knowledge development tool. The idea tags could serve as a think tank for referencing design ideas and directions that are grounded in research (Figure 8).

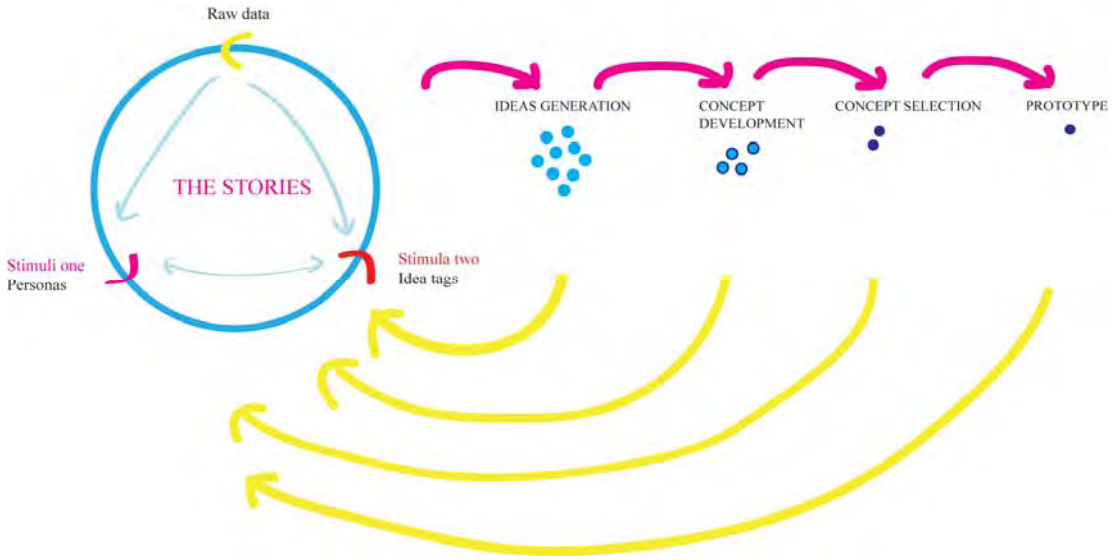

Figure 8 The sensitizing tool as a reference resource and a think tank
Source: Wang, S. (2009)

FOR RECONNECTING THE VALUE OF ETHNOGRAPHY

From the perspective of innovative ethnography, the sensitizing tool could help reconnect traditional ethnography with design. It emphasizes the educational role of ethnographic research and the role of designers in co-creating knowledge and design solutions.

CONTRIBUTIONS

This study is one of the first research projects to explore a new application of ethnographic research framework in the smart home industry. It demonstrates that design ethnographic tools are not only able to gain in-depth understanding about users and promote user co-creation of new knowledge, but also can be used as a sensitizing tool for developers in technology-push sectors. Moreover, it could be used to challenge preconception of users.

The research also provides insight into older adults' relationships with their homes. Provocative and imaginative enquiries helped identify many surprising ideas. For some participants, 'feeling at home' has less to do with built environments than being surrounded by lifelong collected items. For others, home is about freedom to do what they want. For many workshop participants, the tool helps remind them that older adults have individual needs and aspirations, and thus should not be

stereotyped. A truly smart home should explore how technologies could enrich experiences, e.g. preserving users' memories.

CONCLUSION

The research investigated the evolution of ethnographic research in design and proposed a new tool based on Cultural Probes's principles to help developers, especially in traditionally technology-push sectors, overcome the preconceptions of their users and fully immerse themselves in the world of users in order to develop user empathy. The research shows that a traditional approach to ethnographic research (e.g. the coding process and narrative descriptions) is still relevant, as it helps developers to examine information easily. However, it is important to combine the traditional approach with the latest development, since the co-creation of knowledge between researchers and users could help open up new ideas and gain information, e.g. values and aspirations, which is hard to capture through other means.

ACNOWLEGMENT

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Ma, Y. (2012). *Brand Perceived Quality Research and Its Value for Designers: An exploratory study of male users in the home cleaning industry of China.*

BRAND PERCEIVED QUALITY RESEARCH AND ITS VALUE FOR DESIGNERS: AN EXPLORATORY STUDY OF MALE USERS IN THE HOME CLEANING INDUSTRY OF CHINA

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Abstract: The popularity of social networks and Internet forums has provided consumers with a new way to submit complaints, which prompts companies and designers to think about what is really good quality? Although the quality of the product or service can be significantly improved in the initial phase of the R&D process, it may have little or nothing to do with the actual result of the product or service to qualify as being excellent. This paper starts with a literature review of the term *perceived quality* to form different perspectives (marketing, branding and research), and then takes as a case study, the research project of male users' *brand perceived quality* in the home cleaning industry of China. It presents the context, process and outcome. Finally concludes with several key issues that designers should consider when implementing such research projects.

Keywords: Brand perceived quality; Interdisciplinary research; Design research strategy & implement

INTRODUCTION

In Chinese ： Quality=质(zhi)+量(liang) is a very provoking phrase in Chinese philosophy, "质"(zhi) has two meanings: one relative with the "form", refers to the internal quality of things; the other relative to the "text" refers to the author's inner moral self-cultivation or the content of works, sometimes it also refers to the artistic style. This philosophy derives from crafters, writers and artists' common belief to create high quality works, and becomes the criteria in different areas. "量" （Liang） means measurement or estimation, it implicates that the notion of quality have to be approved by detail measurement and in depth research. Nowadays, it seems product quality is a much more complicated term than it appears. Product quality at first caused intensive discussion in the field of marketing, later emerged in the field of brand management. There are a variety of perspectives that can be taken in defining and measuring it.

Key question for this paper is:*

Q1: What are the various definitions in different perspective? (marketing, branding and design)

Q2: Are there commonalities among each other? What will be the share value?

Q3: How to research and understand brand perceived quality by designer? What will be the main strategy, stages and methods?

Q4: The advantages and challenges for designers when implementing *Brand Perceived Quality* Research project.

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WHAT IS PERCEIVED QUALITY?

FROM MARKETING PERSPECTIVE

OBJECTIVE QUALITY VERSUS PERCEIVED QUALITY.

Accoding to Zeithaml (1988) quality can be defined broadly as superiority or excellence. By extension, perceived quality can be de-fined as the consumer's judgment about a product's overall excellence or superiority. Perceived quality is different from objective or actual quality. (Holbrook 1981, Corfman 1985), for ex-ample, distinguish between mechanistic and humanistic quality, mechanistic quality involves an objective aspect or feature of a thing or event; humanistic quality involves the subjective response of people to objects and is therefore a highly relativistic phenomenon that differs between judges.

Zeithaml claims that perceived quality is a higher level abstraction rather than a specific attribute of a product. It components three different level of abstraction: first (lower level attributes), which includes extrinsic and intrinsic attributes. Second, perception of lower level attributes. Third, higher and more complex level is corporate reputation, brand name, level of advertising, etc. Attributes that signal quality have been dichotomized into intrinsic and extrinsic cues (Olson 1977; Olson,Jacoby 1972). Intrinsic cues involve the physical composition of the product. Extrinsic cues are product-related but not part of the physical product itself. They are, by definition, outside the product, price, brand name, and level of advertising are examples of extrinsic cues to quality.

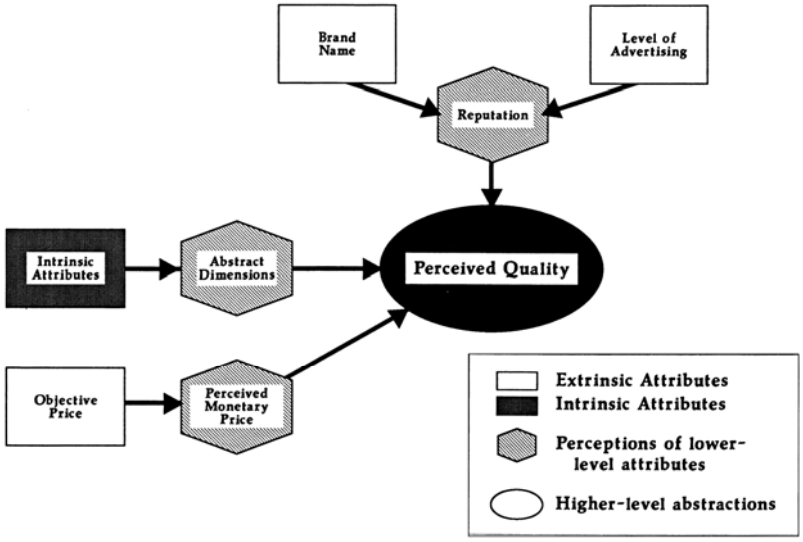

Figure 1 The Perceived Quality Component

Source: Valarie A.Zeithaml. Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence. Journal of marketing,1988, 52(7).

CUSTOMER-BASED DEFINITION

Modern definitions from the literature make it clear that quality cannot just be defined in relation to some abstract concept of "excellence", but should be seen in relation to the demands of the user of the final product. This definition derived from Juran's (1974:22) discussions of quality as 'fitness for use'. Crosby (1979:17) also stated: 'Conformance to requirements rather than goodness, or luxury, or shininess, or weight'. Other definition basically says that quality is meeting or exceeding customer expectations, and building customer relationships ,'Quality itself has been defined as fundamentally relational: Quality is the ongoing process of building and sustaining relationships by assessing, anticipating, and fulfilling stated and implied needs. (Winder, Richard E.,Judd, Daniel K., 1996)

RESEARCH OBJECTIVE AND METHODOLOGY

Marketer want sales now, the main goal to improve quality is to meet sales targets and dealing with retailers, as shapers of their NPD agenda. They try to research and manage quality by control it to fits a certain market segment, for instance the perception of quality products can be very different between teenagers and elderly people. Another example is low quality products can also be very successful in market, while the price is relatively lower and encourage more purchase in certain targets.

Marketing research is to gather information about any number of marketing related issues, including customer perceived quality of new product launches, product quality dimensions that effects consumer buying decisions, competitor analysis, etc. Overall Marketing research is aim to understand mass market and consumer segmentations in order to get a big picture.

FROM BRANDING PERSPECTIVE

PERCEIVED QUALITY AS BRAND EQUITY

Brand equity, first explored by David Aaker in the late 1980s, has emerged as one of the most crucial concept since 1990s(Leuthesser,1988; Farquhar,1989;Keller,1993; Cobb-Walgren, Ruble, Dontu, 1995; Lassar, Mittal & Sharma, 1995).Brand perceived quality is one of the four key elements of Brand equity, besides brand awareness, brand association and brand loyalty (Aaker, 1991; Keller,1993; Gordon 1994).Brand extension uses *perceived quality* as guideline for NPD, and intend to gain significant market share at minimal entry costs. *Brand perceived quality* very often saves corporation in product-harm crisis (Yu mingyang, Yang fangpin,2008:45).

BRAND AND ORGANIZATION-BASED DEFINITION

Factors effecting on brand perceived quality include product quality, service quality, organizational perception. **(**Lei Ming, Ma Min feng,2009:303）

The trade mark fuctioned as a quality assurance device. Branding is about creating and sustaining trust, it means delivering on promises. Every brand has to think about its total chain of quality assurance: products, packaging, services, in-store environment and online interactions, etc.

Brand perceived quality is classified in three levels for brand communication: (Olins,2000;Neumeier,2006;Mogens,2009).

- Visual identity: brand name, logo, color, product shape, packaging, in-store environment, etc.
- Brand promise: product and service function and performance.
- Brand image: The impression in the consumers' mind of a brand's total personality (real and imaginary qualities and shortcomings).

RESEARCH OBJECTIVE AND METHODOLOGY

‘The best and most successful brands are completely coherent. Every aspect of what they are and what they do reinforces everything else’ (Olins, 2004:175). All factors must follow consistent and coherent communication that is maintained and supported to reinforce trust and promises created by brand. (Goodchild, j. and callow, c., 2001; Olins,2000). This ensures that every aspect of a brand is seen and feels the same for customer, supplier, shareholder, or an employee, and this establishes a positive experience.

(Olins,2003;Abimbola,Vallaster,2007). Therefore, *Brand Perceived Quality* research should implicate quality dimensions that are consisting with brand vision, mission and value. Brand equity assessment serves as an important measurement of strategic value for internal (corporate) use as well as for a number of external stakeholders (Ambler, 2000; Jones, 2005). However, brand equity assessment proves to be executed in very heterogeneous ways (Keller, 2006, Kotler, P.; Wong, V.; Saunders,J ; Armstrong, G. 2005) and calls for more holistic view (Ambler, 2000) in line with stakeholder thinking, where the firm’s performance linked to multiple stakeholder considerations.

Research goal could focus on measuring perceived quality of existing brands as one aspect of brand equity assessment, or discovering quality clues for new brand extension opportunity. Depending on the question being asked, *Brand Perceived Quality* research methods can be either qualitative as well as quantitative. Since Branding is overall a dialogue process between inside and outside audiences, *Brand Perceived Quality* research can target at either internal stakeholders such as employees, suppliers or external stakeholders such as consumers, users and media, etc.

FROM DESIGN PERSPECTIVE

OBJECTS ARE PERCEIVED ON THREE LEVELS

According to Perice's semiotic model (1991), the mental interpretation process into three different stages of categories, a SPA (Semiotic products analysis) model (Anders Opperud, 2004) is developed to be usable for practical design work:

- The *representamen* is here defined as the concrete physical aspects and attributes of the design (shape, color or material).
- The *object* is here defined as the spontaneous impression that the product evokes in the user (e.g. an association, a metaphor, or an analogy).
- The *interpretant* is here defined as the subjective meaning of experience of the product, which the person constructs when mentally connecting the *representamen* and the object in a context.

Jodan (2000) adapted Maslow's(1970) well known hierarchy of needs ,to characterize a new hierarchy of consumer needs. The lowest lever concern the functionality and then go up to usability, if they are satisfied, the user will look to the top of the hierarchy for pleasure. Norman (2004) claims aesthetically pleasing objects appear to the user to be more effective, by virtue of their sensual appeal. This is due to the affinity the user feels for an object that appeals to them, due to the formation of an emotional connection with the object. Norman's approach is based on classical ABC model of attitudes. However, he changed the concept to be suitable for application in design. The three dimensions have new names (visceral, behavioral and reflective level) and partially new content. Norman shows that design of most objects are perceived on all three levels (dimensions). Therefore a good design should address all three levels.

- Visceral design → Appearance
- Behavioral design → Pleasure and effectiveness of use.
- Reflective design → Self-image, personal satisfaction, memories.

RESEARCH OBJECTIVE AND METHODOLOGY

According to Buchanan (2004:43) design is a strategic discipline of management: the aim is to facilitate the relationship between people and objects, the recognition of different typologies of knowledge and expertise for managing organizational operations, taking into account the critical importance of accounting, finance ,human relations, strategic planning and visions, as well as the social-cultural contexts.

Designers' fundamental responsibility is to create quality products that generating enjoyable human experiences, they also need to take advantage of organizational strength, such as market competitiveness, brand equity in order to maintain and improve the quality design in the long term.

Design research methods such as ethnography research and user testing are aiming to identify personality traits that influence quality perceptions, including: Lifestyle and psychographic determinants; personal interests and opinions; individual preferences toward objects. The research population unit is necessarily the individuals, since the final aim is to measure personality traits.

Designer sometimes believes perceived quality is intuited rather than measurable. A design project may be achieving quality on a dimension that marketer or business people do not consider important or do not notice that it is potentially valuable. Designers are talented in those non rational

thinking, which can break the normal mentality, and find people subconscious, vague, unclear demand.

Table 1 Perceive quality research in different perspectives (marketing, branding and design)

Perceived quality	Marketing	Branding	Design
Levels of perception	Ingredients, appearance	Visual identity	Visceral design: (Appearance)
	Function& performance value for the price	Brand promise	Behavioral design: (Pleasure and effectiveness of use)
	advertising image, corporate reputation	Brand image Brand value and vision	Reflective design: (Self-image,Personal satisfaction,memories)
Research Objectives	a)Fitting certain market b)Understanding customer expectations.	a)Brand equity assessment b)Identify quality dimensions that are consisting with brand vision and value	a)Identifying personality traits that influence quality perceptions b)Finding human experiences and values
Research Methodology	Marketing research Consumer research	Brand equity research Corporate research	Ethnography Research User testing
Reference population	Consumer group	Internal and external stakeholders	Individuals

COMMONALITIES AND SHARED UNDERSTANDING

The literature review indicates that perceived quality can be presented using a multi-dimensional and hierarchical construct, with tangible and intangible dimensions. Since product tangible attributes is quite similar today: almost the same ingredient, similar packaging,function and performance. Accordingly, attempts to improve the quality of the tangible product have been a common response to intensified competition. Economies right now are fundamentally becoming less about physical objects and more about creating ideas and experiences (Gaynor Aaltonen, 2010). Quality of intangibles becomes key competitive advantages.

No single product can hope to satisfy everyone, no matter marketing, branding and designing a product, we all have to know the audience for whom the product is intended. Generating high quality requires an understanding of what quality means to a target group or individual, in the end human being.

To understand perceived quality, there are various research purposes and methods. However, the identification of the underlying quality dimensions should be useful for each and different discipline for further research and measurement.

PILOT STUDY

PROJECT CONTEXT

Based on extensive literature search (for answering Q1: What are the various definitions in different perspective? Q2: Are there commonalities among each other? What will be the share value?), which is briefly reported on in the previous section, a research project was developed as a pilot study. Participants of this research were 3rd year students of Brand Design and Management (BA) at the Design School of East China Normal University. In the exploratory phase of the research project, company research, focus groups, and in-home consumer interviews were conducted to gain insights into consumer perceptions of quality and value. The project was implemented in four main stages. Analysis of the project process and outcome was imperative for answering the following questions:

1. Understand why and how males are taking care of and cleaning their home.

2. What kinds of products do they use?
3. What are their habits?
4. What are their motivations for cleaning?
5. What are their attitudes toward two cleaning brands *“WHITE CAT”* and *“MR. MUSCLE”?*
6. What are the key quality dimensions for further design consideration?

WHY IN THE CONTEXT OF THE HOME CLEANING INDUSTRY OF CHINA?

According to the latest statistics of the National Bureau of Statistics, soap and synthetic detergent manufacturing industrial output value (current prices) in 2010 was 118.142 billion RMB, 112.526 billion RMB sales output value (current price). Detergent production was 8.2675 million tons in 2010, an increase of 5.15%. Among them, synthetic detergent, 7.3007 million tons, an increase of 4.60%; detergent 392.62 million tons, down 1.74%; fat (HKSAR) of soap 966.8 thousand tons, an increase of 9.46%. In the "Eleventh Five-Year" period, the average growth of output of main products of the detergent is more than 6%. Industrial output value of the average annual growth rate is more than 13%. (CCA, 2011).

Additionally, one of the partners on this project was Helen Tong, who is currently a Design Researcher for SC Johnson in Shanghai. She has experience doing user research with Chinese consumers for the home cleaning industry, which uniquely qualifies her to apply consumer insights to innovation in consumer products for China. She contributed by providing supportive information and industry knowledge, mentoring the students on the research plan, design methods and process throughout the whole project.

WHY MALE USERS?

A growing market segmentation, men and women are shopping more together and men are making more shopping trips on their own for products in areas which traditionally exclude them, such as groceries and household goods. The Chinese traditional notion of men work outside the home and women manage inside the home, therefore the woman should undertake most housework. The male users are not willing to directly express their attitudes toward this product category. It will challenge design students to develop strategic research planning and suitable research methods to uncover insights behind male users’ motivation and perception.

User demographics: males between 25-32, married with family, employed, income: 2500-3500 RMB/month, lives in 1-2 BR home location.

COMPARATIVE RESEARCH: “WHITE CAT”VS “MR.MUSCLE”

Through market research reports and preliminary user interviews, we found that in China, these two brands occupies a large market share, the former is familiar to the Chinese public, a well known local brand, the latter which is a U.S. brand with high visibility on the mainland, brand images are quite different between these two brands, “WHITECAT” is tailored for females, the latter is more attractive to male users. By doing comparative research on males, we tried to distinguish the brand quality perceptions between these two brands. Below is some background information for these brands.

“WHITECAT”: The manufacturers of *White Cat* pioneered the use of concentrated laundry powder in the Mainland nearly 50 years ago. Later, the company was among the first to produce liquid laundry detergent and the first to offer dishwashing liquid. The *White Cat* brand was extraordinarily well known, with about 90 percent recognition even in remote regions of the Mainland. Over the years for branding and sales, *White Cat* consists of six series of products, for example, fabric detergents, fabric softener, detergents, kitchen cleaners, washroom cleaners, auto toilet cleaner and etc. (source: http://www.hutchison-whampoa.com/upload/en/about/journal/Sphere_30-WhiteCat_E.pdf)

"MR. MUSCLE": Launched in the UK in 1986, *Mr Muscle* is one of the most contemporary products in the company's portfolio. In a short time, Mr Muscle has become a household name to its global customers, by understanding their cleaning needs at home and by adapting to the changing consumer habits that have taken place over the years. Through constant innovation and scientific research, *Mr Muscle* has created products at the forefront of its field. The *Mr. Muscle* brand line up includes products for bathroom and toilet cleaning, glass and surface cleaners, floor cleaners and polishes, kitchen cleaners and degreasers and more. (Source: http://www.mrmuscleonline.co.uk/our_heritage.html)

Stage I: Identification of Quality Dimensions

As we mentioned in the first part of this paper .There seems has different research purposes and methods from different disciplines when researching the same topic, therefore designer should not only use and fully rely on marketing and brand research results. Depending on the design project context, the identification of the underlying quality dimensions should be carefully researched and redefined.

EXISTING SOURCE OF INFORMATION

In this stage, industry literature and policy review, business profession's interview is really very helpful to find out fundamental quality dimensions. The list of quality dimensions in the home-clean industry can be generated in various ways, using different existing source of information, such as marketing and consumer research report, corporate brand research report, etc.

One ways is that we ask design students to investigate literature (such as industry reports, trade journals, company websites etc.) *Another way is to study the product or service. this study should include profession involved in the business or NPD process, people who are in a good position to understand the propose or function of their jobs in relation to meeting customer expectations* (Bob, 2008:12).In China, industry policy influences the NPD processes, we also looked up "the Cleaning industry '12th Five-Year Plan'" Issued by China Cleaning Industry Association. Finally, we summarized three quality dimensions that are broadly mentioned:

1. Product performance: decontamination, rinse easy, efficient, multi-functional.
2. Product safety: the safety of the ingredients for users.
3. Environment impacts: Reducing impacts upon the environment, energy saving, water saving, emission reduction.

Redefine quality dimensions for the project

According to Norman's (2004) three levels of design (visceral, behavioral and reflective level) that we have discussed, it seems the first level "visceral", such as product appearance and the last level "reflective", such as self-image, personal satisfaction, memories have not yet been considered as important quality dimensions. These two levels are crucial for designer to deliver products that meet consumer and user's satisfaction. Product performance as a quality measurement focusing a lot on functionality in the previous marketing and brand research, lacking understanding on usability and other emotional assets. Therefore we decide to research product performance in the aspect of pleasure and effectiveness of use, the same pointed as Norman's behavioral design level.

We find existing marketing and consumer research are heavily focusing on product quality. As mentioned above, quality dimensions should implicate consistency with brand vision, mission and value. Brand image, organizational perceptions are key dimensions. Other quality dimensions like product safety, environment impacts are also relevant to design , but since we have limited project time, we will investigate them in other projects.

Finally we decided focusing on four quality dimensions for further research:

1 Product appearance: shape, color, material, etc.

2 Product performance: pleasure, effectiveness of use, etc.

3 Self-reflective attributes: self-image, personal satisfaction, memories, etc.

4 Brand image, organizational perceptions.

The main question will be for both brands whether they are important perceived quality dimensions for consumer and user? Will they generate new design considerations?

Stage II: Ethnographic approaches: what people say, do, use

Applied ethnography is recognized today as a new form of consumer research that is useful in uncovering and identifying emerging and unmet customer needs. 'The objective of the ethnographic approach is to obtain information about people from their own perspective, which makes it distinguish.'(Dori T.,2006:29)

We used ethnographic approaches to capture what people say, do and use. We conducted field studies or do home tours because those places better reflect people's own values and objectives.Research venue are those areas that married males often show up, such as parks, IKEA and supermarkets. In-home interviews are very appropriate for personal questions and user testing. According to the research location, suitable quality dimensions were defined for testing. Before conducting research, adequate preparation and planning were made in order to capture best stories within a limited time.

Table 2 Ethnographic approaches and research plan

	What people say	**What people do**	**What people use**
Research objectives	Understand males' general awareness of brands: a)brand-image, b)organizational perceptions	Understand males' General attitude & preference towards products and brands: a)product appearance b)brand image, c)organizational perceptions	Investigate quality dimensions that affects product use: a)product appearance, b)product usage c)product performance
Research venue	IKEA Park	Supermarket	Home Community
Research methods	Intercept interview	Observations Intercept interview	Observations In-home interviewing

StageIII: Analyzing, mapping and framing data

AEIOU FRAMEWORK

Since in supermarket, the whole buying process is relatively short, so it is difficult to record and analysis observations, some auxiliary tools is very helps designer more naturally and effectively gain understanding of a target population such as: mounted video cameras, roving cameras (hand held by an observer), photo analysis.

We used AEIOU framework designed by Robinson and E-Lab LLC, to map and structure information after observation in the supermarket. The purpose is to develop a more comprehensive and holistic view of perceived quality relate to product appearance and male's self-reflective attributes. Each one of the letters in AEIOU corresponds to a word: Activities, Environments, Interactions, Objects, Users. This breakdown helps identify what specific points to research.

- "Activities" are goal directed sets of actions- things which people want to accomplish.
- "Environments" include the entire arena where actions take place.
- "Interactions" are between a person and someone or something else, and are the building blocks of activities.

- "Objects" are building blocks of the environment, key elements sometimes put to complex or unintended users, changing their function, meaning and context.
- "Users" are the consumers, the people providing the behaviors, preferences and needs.

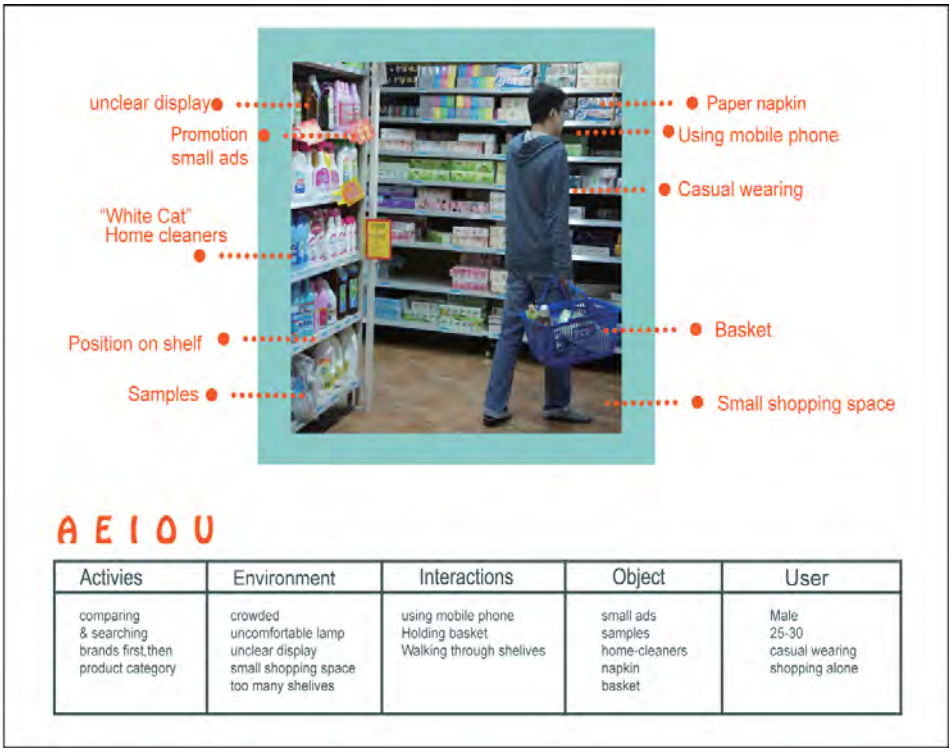

Figure 3 Use AEIOU framework to analysis observations in supermarket, research on Males' attitude & preference towards products and brands.

Mapping human senses

Our impression and emotional connections with products and brands are formed by our senses. Far too often most brands only concentrate on the visual impacts of their offering, in this project, we try to stimulate user's poly sensory product experiences when they see, use and feel the product. We try to map people's responses to a product as perceived through three senses: Smell/Olfaction, Touch, Vision, which facilities to analysis quality dimensions testing: product appearance (see), product performance, (touch) self-reflective attributes and brand image (see/touch/smell).

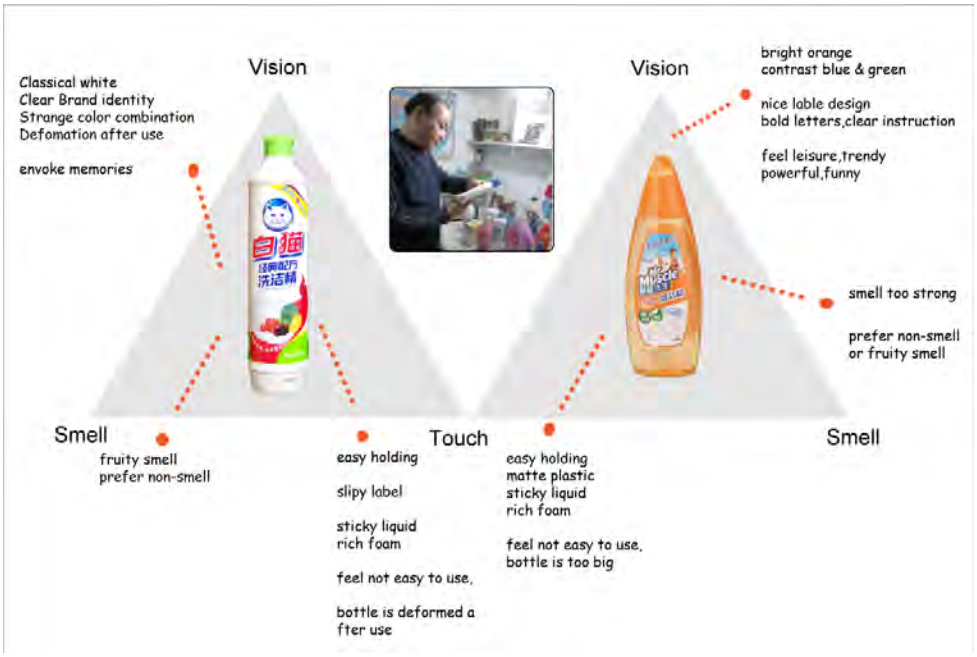

Figure 4 Smell/Olfaction, Touch, Vision: sensory facilitate quality dimensions testing

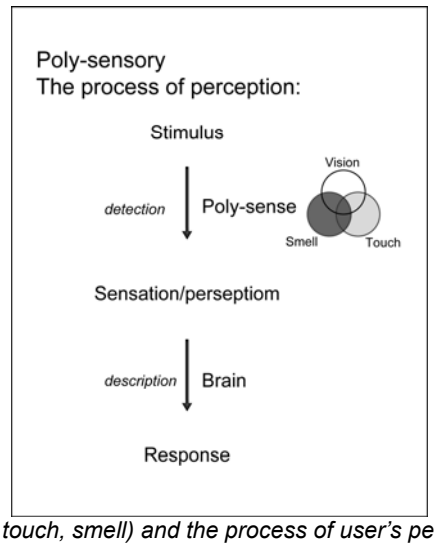

Figure 5 Poly sensory (vision, touch, smell) and the process of user's perception

VISUAL COLLAGES + WORD COLLAGES

Designers are visual thinker. Concepts related to visual thinking have played an important role in design education over the past several decades. Research and literature are published since 60s, (Rudolf Arnheim,1969; Robert McKim ,1971; Betty Edward,1979).Theory and practice in the design of data graphics are developed, graphics play an important role in the understanding and interpretation of statistical findings and complex concepts (Edward R. Tufte 2001).' Ideas when we interact with an information display, such as map, diagram, chart, graph, or a poster on the wall, we are usually trying to solve some kind of cognitive problem'. (Colin Ware, 2008: 3).

In this project, design students started collecting many visual collages such as photos, sketches, videos. Then they made word collages after mapping all these visual collages, in this way, they really investigated visuals carefully, looked every details, list important questions and insights. The *Symbol+Word* collages were carried out after the *Picture+Word* collages, the former helped designer to group and summarize ideas received from the more emotional associations that males made in the interviews. We transformed all the visual collages (photos, sketches, symbols) into *analytic visuals (map, diagram, chart, graph)*, they were really helpful for generating ideas and key

quality dimensions. We gave a name and some key words for each idea, and made a brief explanation afterwards.

Table 3 interplaying and processing visual collages +word collages

levels of design	Quality dimensions	Visual collages	Word collages
Visceral design	Product appearance	**Photos** of products and people **Sketches** of products	**Detail description** product design environment people Quotes interview consumer buying process product using process
Behavioral design	Product performance	**Photos** of products and people **Sketches** of product usage **Videos** of activities	**Description of behavioral traces** product tear and wear user's experiences
Reflective design	Self-image Personal satisfaction, Memories	**Symbol**	**Description of emotional associations**
Summarize Ideas	Summarize key Quality dimensions	**Map, diagram, chart, graph.**	**Key words** **Brief explanation**

stage Ⅳ: Insights and Design Considerations

We found self-reflective attributes such as memories, self-image, personal satisfaction are considered as very important quality dimensions for males. Self-reflective attributes will also effects the perceived quality on the product appearance and product performance level. Organizational perception is very week for both brands.

CONSISTENT WITH MOTHER'S PERCEPTION

Male's choices of products and brands are usually influenced by his mother. For example "White Cat" has a long history, since the parents' generation are very familiar with this brand, it is still very popular with highest market share now in China, some male users even associate this brand as memories of childhood and their mothers .Therefore brand extension is necessary to consider retaining the classic packaging and product categories. New product launch should consider keep original and classical quality dimensions such as spotlessly white, softness, comfort, etc.

ASSOCIATE PRODUCTS WITH MALES' SOCIAL STATUS

Many males told us: "when I choose a brand or a product, I feel they are also a status symbol", they do care about the brand's reputation and advertising, usually do not like using very cheap or poor packaging design products ,more willing to try high-end brands and products. Some Males dislike *White Cat* because of the feminization of the packaging design. They find *Mr. Muscle* implicates power, efficiency and masculine characteristics.

CLEANING AS LEISURE

Due to daily excessive work pressure, when males doing the housework, they hope to enjoy the process and easily finish the task, important quality dimensions are effectiveness of the product, ease of use. Lacking of cleaning experience, they hope the shape looks simple, easy to use, label and packaging design should help them to easily understand the product usage, processes of use and precautions. Product appearance (color, visual style, material, etc.) should evoke feeling of relax and pleasure.

BRAND IMAGE AND ORGANIZATIONAL PERCEPTION

Organizational perception is an important factor of the brand perceived quality, it is consumer's perception of business organization that hidden behind products and services of a target brand, including the history of the organization, attribution, origin, and business philosophy, etc. (Lei Ming, Ma Minfeng, 2009:303) .We found that male users have weak organizational perception for both brands, many users even do not know the corporate name behind the products. The gap between product image and brand identity is obvious. Males' perceived quality can't reflect brand identity and vision. For product design and brand communication, both brands need to pay attention to the spread of corporate philosophy and culture.

KEY FINDINGS AND DISCUSSIONS

Various parts of customer interactions with a brand require designers to break out from the heavily product and market focused research. Management of good quality of design is how to connect and integrate different knowledge. In this project, Design students have to understand different perspectives of perceived quality (we mentioned in part 2). Design researchers should value the contributions of other disciplines while finding their own way to define and discover quality dimensions.

Designer must not fully rely on their own intuition and imagination. Differentiation and complication of people's perception of quality encourages the importance for designers to attentively use research methods to understand consumers and users in their everyday lives.

Due to short research time and complicate research environments, designer really have to make a clear plan and many preparations before conducting a research, we found several practice interviews is very helpful before a real execution.

Facing complex research data, designer usually can't make the clue, some basic information analysis framework will be very helpful for them such as AEIOU frame, mapping human senses of product experiences. They can make good use of visuals since they are relatively visual thinker , they can easily capture tangible quality dimensions, such as shape, color and material, and visualize intangible quality dimensions such and emotional assets with symbolic images. Interplaying visual and word collages is very helpful for mapping thoughts and generating interesting quality dimensions for new design considerations.

Designers are endowed with creativity and imagination, they can very often tackle personal problems, designer's advantages may be more to find potential quality factors that is not yet sensed and recognised. Changing the perception of quality is a long-term proposition, for designer, creating a quality product or brand, however, is only a partial victory; perceptions must be created as well.

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INFORMATION SYSTEM FOR VISUALIZING USER RESEARCH TO LEAD INNOVATION

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It is commonly accepted that user research has crucial benefits for the design process including its contribution to innovation processes. In order to lead innovation through user research, besides the content of the research, it is important that the delivery should be done effectively so that design strategies that result in innovation can be adopted in the design process and the findings can guide designers to create novel outputs. This paper aims to discuss the requirements for user research delivery that aids in innovative design processes on the basis of an information system that is designed for communicating the findings of user research regarding automotive design.

Keywords: User research deliverables; effective communication of user research; perceived qualities in automotive design

INTRODUCTION

There are different views regarding how to achieve innovation in business settings. Users are seen as an important source for innovation and this view is supported by many scholars in the field (Chayutsahakij & Poggenpohl, 2002; Leonard & Rayport, 1997; Thomke & Von Hippel, 2002). On the other hand, according to scholars such as Verganti (2009), if companies are striving to achieve radical innovation they should avoid adopting a user centered strategy at the beginning of their design processes. Supporters of this view claim that since user research is about the current circumstances regarding the context and usually based on people's personal opinions which rely on existing products, such kind of research cannot lead to breakthrough ideas. Radical innovation driven by design can take place through generating new meanings for utilization of existing technologies (Verganti, 2009). However such radical innovations can only be valid if the new meanings are adopted by users. As a matter of fact user research activity that is conducted with generative purposes usually aims at identifying such kinds of new meanings for the user (Chayutsahakij & Poggenpohl, 2002). As the receiver of the user research information the designer synthesizes this knowledge to design products (Kolko, 2011). Therefore, how findings of user research is communicated to the designers is as important as qualities of information gathered through user research, especially if the designer is unable to get involved in the research process due to division of labor in today's market conditions (van Veggel, 2005).

If user research findings are communicated effectively, it would be helpful in overcoming the problems of insufficiency of design briefs in conveying information that the designer needs for starting the design process. It is well received that effective briefing has critical importance (Petersen & Phillips, 2011; Phillips, 2004; Topalian, 2010). However usually briefs generated by

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non-design departments lack in clarity and do not include the information that the designer needs for initiating the process or sometimes too fixed in a sense that it limits creative idea generation phase for the designer. Designers start the design process with incomplete data and develop certain constraints which are not covered in the brief and generate new meanings in the form of design (Kolko, 2011). In order to feed this process with user research, it is important to understand the designer's mental model regarding the synthesis activity and develop communication mediums for effective and inspirational delivery of user research findings in a way that it does not limit the designer's creativity, opens up ways to identify new solutions for future designs, and open to free interpretation of the designer.

Besides the designer's needs of user information, such an effective delivery has crucial importance from managerial perspective to be able to develop design strategies that can result in innovation. Receiving well-grounded information with a delivery that is properly structured enables to support well-established design strategies.

This paper introduces a novel information system that is designed for delivering the findings of a user research study. The study focuses on perceived quality variables regarding automotive design. The main purpose for introducing this system is to discuss the requirements of effective delivery of user research. In the following sections first the content of the information system is briefly presented by introducing the scope of the user research activity that is carried out, and then the information system is presented by discussing the requirements that are considered while designing the system.

CONTENT OF THE INFORMATION SYSTEM

The system is developed for delivering the findings of a user research project for an automotive company. Structured in-depth interviews are carried out with the potential user groups in a laboratory environment through open ended evaluations of the competing products. The data is about the dimensions of perceived quality in midibus design and relations between perceived qualities and product components as well as their impacts on user evaluation criteria.

Measurable qualities for automotive design are elicited from regarding literature sources (such as Hossoy, Papalambros, Gonzalez, & Aitken, 2004; Karlsson, Aronsson, & Svensson, 2003; Yun, You, Geum, & Kong, 2004) and by considering these qualities and the company's priorities, a variable pool is generated in order to formulate the structured in-depth interview study. Three midibuses located next to each other are evaluated by the participants considering each perceived quality both quantitatively and qualitatively by explaining the underlying reasons of their evaluations. Obviously, users mentioned the other qualities in the pool or put forward different qualities through certain attributes of the product. This multidimensionality is considered curiously during the analysis phase.

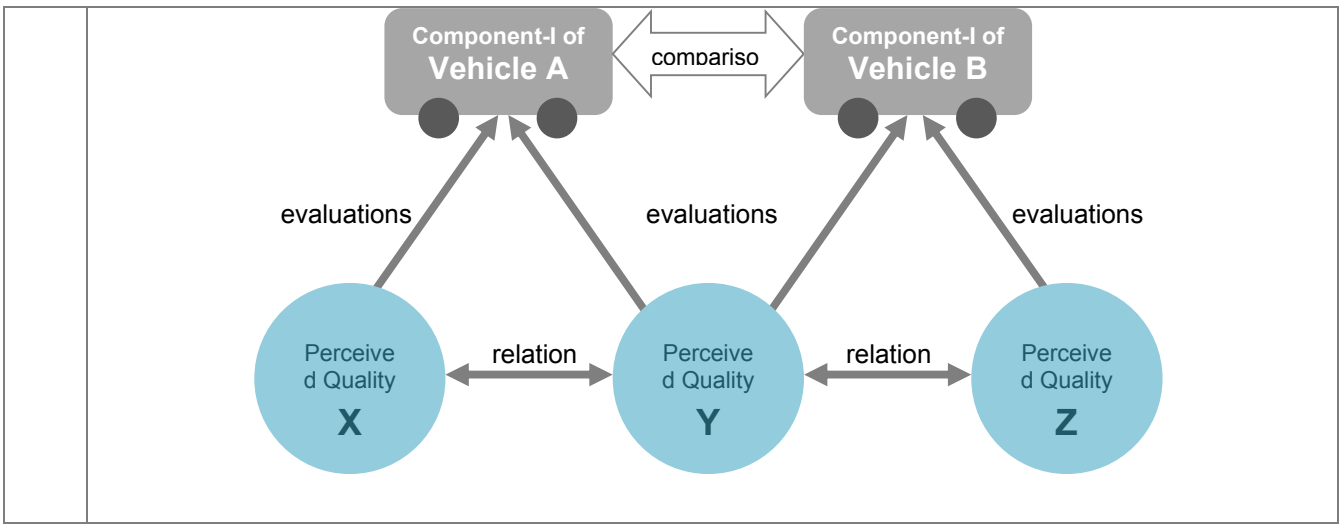

Figure 1 Conceptual representation of perceived qualities study

Figure 1 illustrates the conceptual model of the structured interview study. The participant is asked to evaluate a vehicle design based on a perceived quality in the concept pool. While explaining the underlying reasons of his/her evaluations s/he compares a certain component of the vehicle with the same component of others. During this comparison, certain relations are established between the perceived qualities of the system. The following statement is given as an example to explain this conceptual structure:

"Craftsmanship quality of the handles behind the seating unit gives me feeling of security"

In this statement there is a link between two perceived qualities "craftsmanship quality" and "security" which is established through a product component "handle behind the seating unit". After this statement how these qualities are achieved with the attributes of product components are questioned in order to clarify the meaning of perceived qualities for the participant.

These conceptual links are elicited through content analysis from the data and implication matrix are generated as the result of the analysis to summarize the number of relations each perceived quality has with the other qualities in the system.

PROBLEMS OF THE PERCEIVED QUALITIES STUDY

Studies on perceived qualities and perceived values has a considerably long history and their importance for marketing and design research is well received in literature (Gallarza, Gil-Saura, & Holbrook, 2011; Zeithaml, 1988). Exploring user values and perceived qualities are suggested especially if new directions and products are planned (Russell et al., 2004; Zeithaml, 1988), since it is possible to understand product related meanings for the target user group. By this way, the designer can create new solutions for the meanings that are more critical or personal for the user. However, what is commonly declared by scholars is studying on such personal constructs has some limitations (Gallarza et al., 2011). It is indicated that one of the major difficulties in research about user values is that the values and qualities are subjective and vague concepts, definitions of which can differ according to users, practitioners and researchers. In order to overcome this difficulty it is important to concretize these vague definitions by exemplifying them with tangible product attributes and with its visuals. Obviously, the exemplification should not restrict the designer's imagination, it should recommend different directions and present all related parameters that are affected by the example.

Another problem regarding these type of studies is gathered data is vastly dense since a lot of perceived quality variables are questioned both qualitatively and quantitatively, the findings include complex relations and richness of the data is not compromised. This methodology regarding

exploration of perceived qualities is employed by UTEST* researchers for two automotive firms. In the first case findings are delivered through a traditional report format in which the narration is linear. In order not to lose richness of the data and to be able to present findings with different perspectives, repetitions in the narration are unavoidable and this makes the delivery bulky and hard to explore. It is observed that it is impractical to communicate such data through conventional deliverables such as project reports, thus for the second case the interactive novel information system is designed by adopting different data visualization methods.

INTRODUCING THE INFORMATION SYSTEM

Figure 2 illustrates the basic model of the system, which has a dual structure, in other words the content can be explored either through searching information regarding perceived qualities or through exploring information about product components. This dual structure has a cyclic character, that is to say, perceived qualities are explained by referring to related product components, and vice versa. Such an interaction structure is adopted by considering the informational needs of designers caused by the issues regarding design briefs:

- When the brief includes vague descriptions of product qualities that are requested in the design, it is possible to explore which qualities are important for the user and through which product components they can be achieved (*exploration based on Perceived Qualities*); or
- when the brief about the design of a product component lacks in clarity regarding which qualities should be met, the system can be explored by examining the relevant perceived qualities with that specific product component (*exploration based on Product Components*).

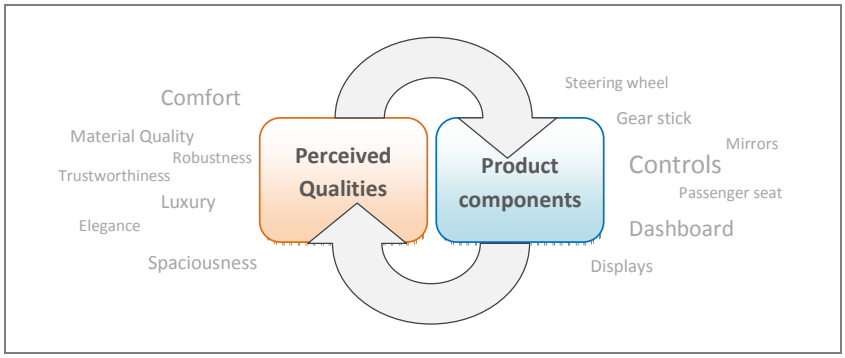

Figure 2 Basic model of the information system- the system can be utilized either searching for information on product qualities or product components.

Interactive system maintains ease of accessing the intended information and it conveys multidimensional data which is hard to deliver through linear narration as in the formal reports. Moreover, it is possible to deliver in-depth information consisting of user comments by avoiding reductivity as well as preventing excess information since the data is filtered through certain levels. By maintaining these qualities for the system, it is aimed to provide a sustainable knowledge source which is open to interpretations of the designer.

In the following subsections requirements that are considered while designing the system are highlighted and then specifications of the system and visualizations that are utilized in the system are introduced by discussing the regarding requirements that are considered while developing the system.

* *METU/BILTIR UTEST Product Usability Unit - www.utest.metu.edu.tr*

REQUIREMENTS CONSIDERED WHILE DESIGNING THE INFORMATION SYSTEM

By considering designers' requirements that are elicited through literature (Töre Yargın & Erbuğ, 2011) and an in-depth interview study with practicing designers in Turkish industry (Töre Yargın, 2012), a list of requirements are formulized for designing the information system. These requirements are classified under two groups which are the qualities of the system and qualities of the information that it delivers since both has crucial impacts on effective delivery of user research. Table 1 lists the requirements that are considered while designing the system.

Table 1 Requirements that are considered while designing the system

Qualities of the system	**Qualities of the information that the system delivers**
Prioritizing problems and findings	Multidimensionality
Informativeness	In-depthness
Conciseness	Sustainability
Interpretability	
Concrete exemplification	
Ease of access to the intended information	
Ability to share/communicate findings	

Interaction scenario of the system which is presented in the following section is designed based on these requirements. After presenting the interaction scenario, the requirements are discussed by referring to the specifications of the system.

INTERACTION SCENARIO OF THE INFORMATION SYSTEM

Figure 3 Main page of the system

Figure 3 illustrates the main page of the system. This structure is the same as the model that is presented in Figure 2. The system can be explored either based on perceived qualities or based on product components. In the following sub-sections the multidimensionality of the system is explained step by step by illustrating its interactive structure.

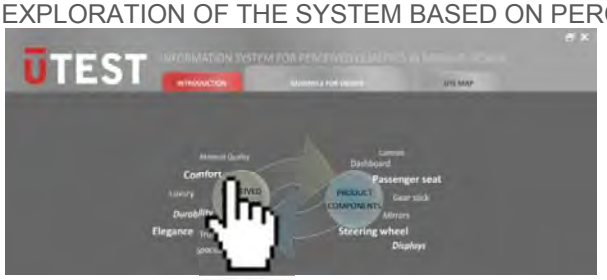

Figure 4 Main page

The hyperlink named as ‘perceived qualities’ is clicked on.

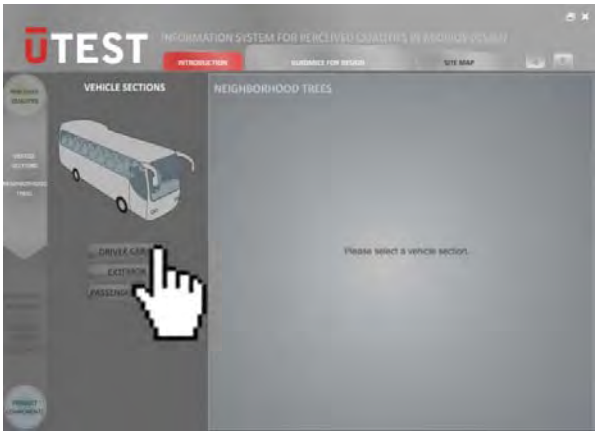

Figure 5 Choosing the sections of the vehicle

A screen representing the sections of the vehicle is shown. These sections are ‘driver cabin’, ‘passenger cabin’ and ‘exterior’, which involve different perceived qualities. When a hyperlink of a section is clicked on its perceived qualities are viewed in the form of a tree graph which is called as Neighborhood Trees. In this example ‘driver cabin’ is clicked on.

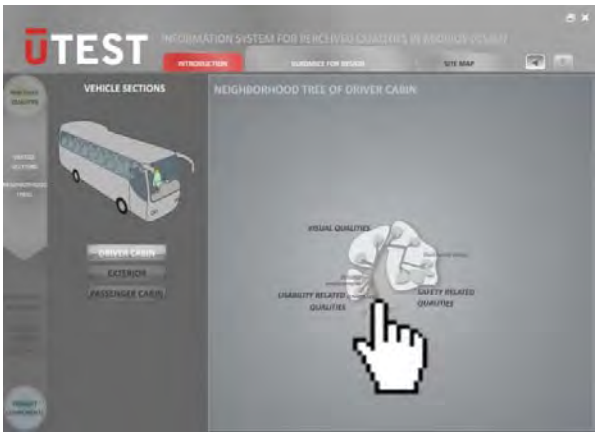

Figure 6 Concise version of the Neighborhood Tree

Firstly, the Neighborhood Trees are presented in a concise form, which is only showing the main groups of the qualities. In the example, these groups are ‘usability related qualities’, ‘visual qualities’ and ‘safety related qualities’. By clicking on each group it can be possible to view the qualities they include.

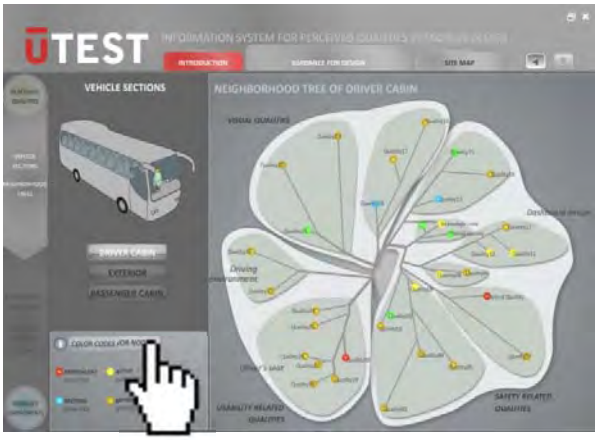

Figure 7 Extended version of the Neighborhood Tree and the legend explaining color codes

These interactive Neighborhood Trees which are illustrating the relation between the perceived qualities are generated in a software PHYLIP* (Felsenstein, 2005). Dominant relations between the perceived qualities are visualized by linking two qualities through a branch of the tree and distances are representing the hierarchy of the qualities. Qualities that are more similar are placed on a same branch on the tree. Nodes of the branch are color coded according to the findings of cross impact analysis that is conducted with the gathered data. When the legend that is explaining the color codes is clicked on, a pop-up screen that is presenting the results of the cross impact analysis is shown and meanings of the colors are clarified.

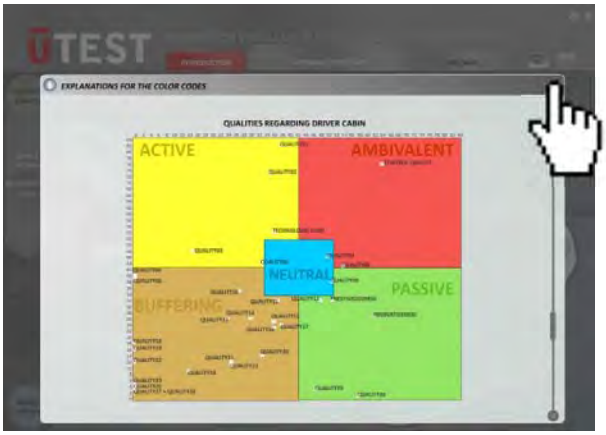

Figure 8 System grid from cross impact analysis

Through conducting cross impact analysis with the gathered data, system grid (Scholz & Tietje, 2002) that illustrates the characteristics of each quality in the perceived qualities system is generated. Qualities in the yellow area is the ones that are more active, that is, they have major influence on the other qualities but they are less affected by them, while the green area involves passive qualities which are affected by the other qualities but they do not have much effect on the others. The most critical area is the red one including ambivalent qualities, they are both affected by the other variables and they have impacts on them. The remaining qualities are buffering ones which has minor effects on and less affected by the other qualities.

By representing activity and passivity characters of the qualities, it is possible to prioritize the ones that are crucial for the design. This pop-up screen can be closed to view back the neighborhood tree.

* *PHYLIP is originally a software program for visualizing resemblance of biological species based on their genetic codes. It utilizes a clustering algorithm which results in a graphical visualization based on a tree metaphor. In this study, this software is utilized for visualizing the closeness between the perceived qualities in the system. The implication matrix that is generated as the result of the content analysis is the data input for the software.*

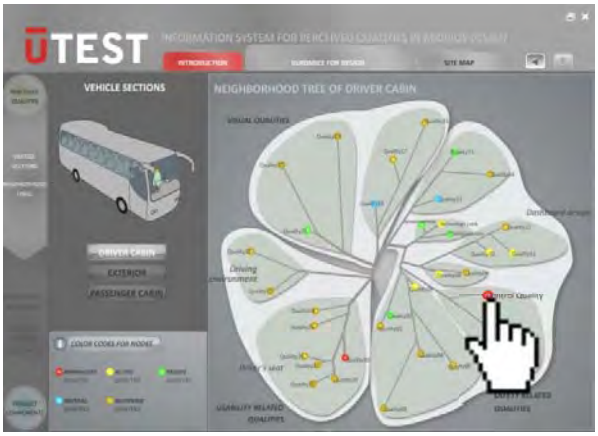

Figure 9 Close up view of the interactive Neighborhood Tree

Each node on the tree is a hyperlink which represents the individual perceived qualities. By clicking on its node, the quality can be explored in detail by viewing its egocentric network diagram of related qualities and attributes of the product components that affect the perception of the quality.

Figure 10 Left: Egocentric network for the perceived quality (incoming nodes – qualities affecting the central quality)

Right: Box for the attributes of the product components

The page regarding the chosen perceived quality illustrates an egocentric network involving the qualities that are affecting the chosen quality. When the page is first opened this network which illustrates the incoming qualities to the central node is viewed. The outgoing nodes involving the qualities affected by the central quality can be viewed by clicking on the second tab above the egocentric network graph.

Diameters of the nodes indicate the frequency of the relation between the node and the central quality, so in this sense it presents a hierarchy of relations.

Figure 11 Left: Egocentric network for the perceived quality (outgoing nodes – qualities affected by the central quality)

By viewing the qualities affected by the central quality, it is possible to understand which qualities are affected from changes in the central quality. The nodes are hyperlinks directing to the pages that represents their egocentric network and relevant product attributes.

In order to view back the incoming nodes the first tab above the graph is clicked on.

Figure 12 Left: Egocentric network for the perceived quality (incoming nodes – qualities affecting the central quality)

Right: Box for the attributes of the product components

The diagram showing the qualities that have effects on the central quality enables to understand how the central quality can be maintained. By clicking on the nodes, the attributes of product components that are affected by two interconnected qualities (quality of the node and the central quality) are viewed in the box at the right side of the page. Both negative and positive effects are presented with visual examples of evaluated products.

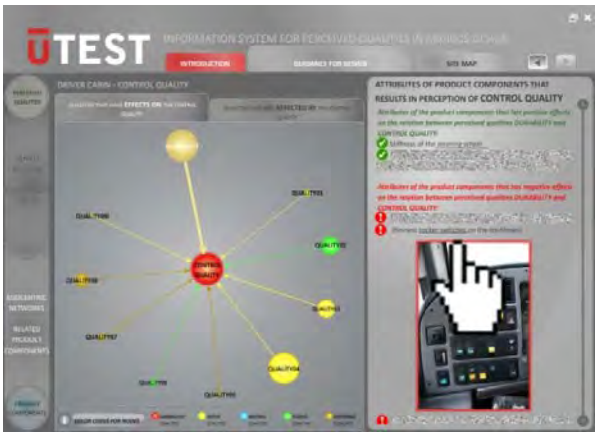

Figure 13 Right: Visuals and hyperlinks for the product components that have effect on the central quality

Names of the product components that are presented in the box are underlined and they are designed as hyperlinks directing to a pop-up screen. All user comments on the attributes of the component are pinpointed on this screen.

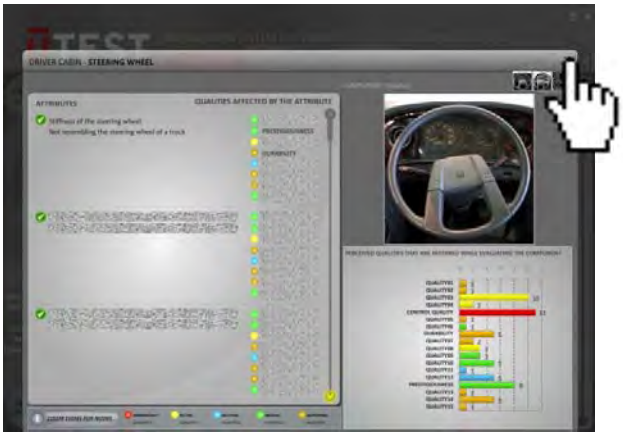

Figure 14 Left: Box for comments on the attributes of the product components together with the relevant perceived qualities with the comment

Upper right: Component visuals

Lower right: Bar chart representing important perceived qualities that are related to the component

In the pop-up screen, all negative and positive comments regarding the component are listed together with the related perceived qualities. In order to examine which other qualities will be affected by the changes in this component, it is foreseen that this way of exploration may be useful for the designer to make use of this multidimensional data by reducing reductivity.

EXPLORATION OF THE SYSTEM BASED ON PRODUCT COMPONENTS

Figure 15 Main page

The hyperlink named as ‘product components’ is clicked on.

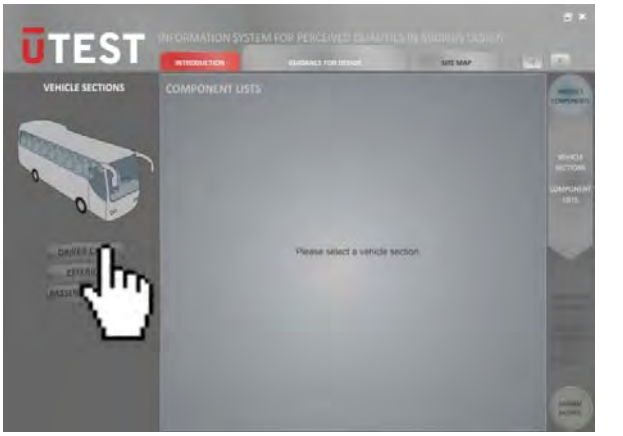

Figure 16 Choosing the sections of the vehicle

The same sections are presented as in Figure 5, but instead of perceived qualities they include components of the vehicles grouped according to these sections. In this example again the “driver cabin” is chosen.

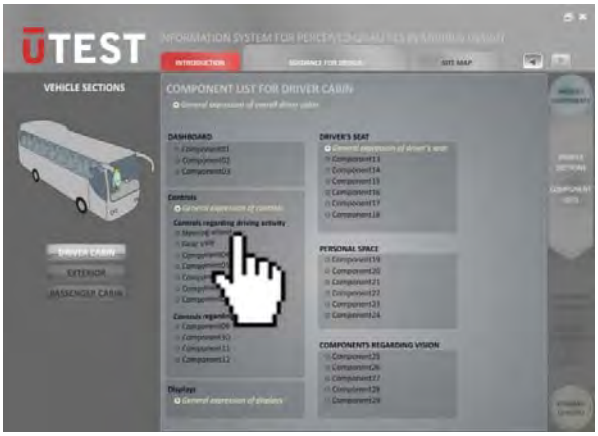

Figure 17 Component list

The list involving the components of the section is viewed. From this list a component is chosen and clicked on.

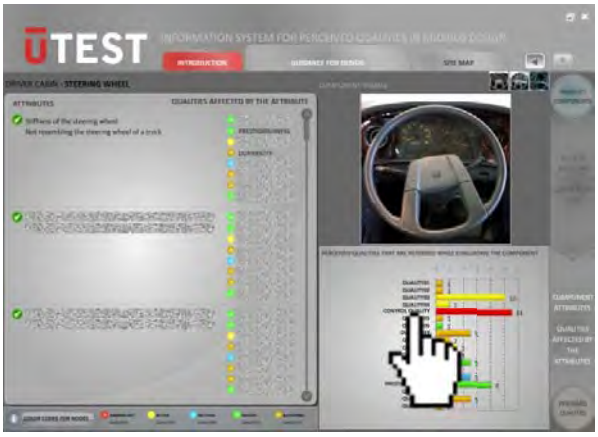

Figure 18 Left: Box for comments on the attributes of the product components together with the relevant perceived qualities with the comment

Upper right: Component visuals

Lower right: Bar chart representing important perceived qualities that are related to the component

All comments regarding the component attributes are listed in the box at the left side of the page together with the perceived qualities that each comment is related to. Component visuals and dominant perceived qualities that the component is found related are also included in this page. Perceived qualities listed in the page are also hyperlinks that open the regarding pages.

Figure 19 Egocentric network and relevant product components regarding the chosen perceived quality

The chosen perceived quality and its relation to other qualities and product components can be explored in this page as in exploration of the system based on perceived qualities. By using back page button, previous view that includes information regarding the component can be accessed.

As it can be understood from the previous two subsections, both exploration ways of the system are connected to the other, the only thing that differs is the interaction scenario. By this way, cyclic character of the conceptual structure that is represented in Figure 2 is maintained.

DISCUSSIONS ON THE REQUIREMENTS AND THE SYSTEM'S ATTRIBUTES

- **Qualities of the system**
    - Prioritizing problems and findings

In order to communicate the findings clearly it is important to prioritize the results by highlighting the primary information for the audience (Barnum, 2002; Blomberg & Burrell, 2008; Rubin, 1994). System grid from cross impact analysis (Scholz & Tietje, 2002) that is presented in Figure 8 is utilized for emphasizing the important qualities according to the findings. Moreover diameter differences of the nodes in egocentric network graphs that are seen in Figure 10 and 11 represent a hierarchy between the qualities that affects the central quality, which means that if the central quality is needed to be achieved, major nodes should be carefully considered by the designer.

    - Informativeness

For the designers a delivery is informative, if underlying reasons are provided for the judgments and statements in the delivery (Abraham & Atwood, 2009; Nørgaard & Hornbæk, 2009) and if the reductivity is avoided by carefully analyzing the data without losing its contextual richness (Blomberg & Burrell, 2008; Diggins & Tolmie, 2003). In the system, as it can be seen in Figure 13 and 18, the boxes involve all individual comments by the users even if their frequencies are not significant. By adopting such an approach, it is aimed to preserve contextual richness and provide explanations for the abstract relations between the perceived qualities.

    - Conciseness

Considering the findings of the previous studies of the authors, conciseness is essential for the information system design, since giving excessive information may distract the audience of the system and make the delivery unattractive, which may result in reluctance from the designer to utilize it (Diggins & Tolmie, 2003; Nørgaard & Hornbæk, 2009). Layering the data through certain levels keeps the conciseness of the delivery, which actually involves vast amount of data if it is explored thoroughly. For example in Figure 6 Neighborhood Tree is presented in a concise way and it can be explored in detail through clicking on the branches and then the qualities on the branches. Likewise, in Figure 17 components are grouped into meaningful categories so that they can be explored more easily since it is presented in a more concise manner.

    - Interpretability

Content of the delivery should not restrict the designer's imagination and support his/her future investigations regarding the subject and in this sense it should be open to "recipient design" (Diggins & Tolmie, 2003). The designer needs to interpret findings to create novel outputs, for this reason, interactivity of the delivery has crucial importance, in other words the designer can easily access the information whenever s/he needs it and s/he can work on the findings by "select[ing], categorize[ing] and organize[ing] the information" in a way that is fruitful for his/her design process (Sleeswijk Visser, 2009). Interactive structure of the system allows designers to explore information in-depthly by examining all parameters regarding the subject in a more accessible way, when it is compared to traditional reports. Features such as "bookmarking" and "annotation" can be considered for providing a more interpretable system for the designer.

    - Concrete exemplification

It is a well-known fact that designer's mode of thinking is product centered rather than user-centered (Dorst, 2003) and communicating on concrete product examples and visuals is more appropriate way for them to communicate complex ideas (Eckert & Stacey, 2000). Abstract concepts such as perceived qualities are found hard to communicate and unclear for the designer (Töre Yargın, 2012). For effective communication, concepts should be exemplified with appropriate visuals and user's expressions as in the boxes in Figure 13 and 18.

- Ease of access to the intended information

Accessibility of the intended information has crucial importance for the usability of the system, since it prevents time loss in the design process (Nørgaard & Hornbæk, 2009). When it is compared to traditional report formats, providing an interactive system with a well-conceptualized structure eases the utilization process of the system. In this study, it is aimed to provide a well-established conceptual structure (as in Figure 2) with an interactive system to overcome the problems regarding insufficiencies of design briefs.

- Ability to share/communicate findings

Compatibility of the delivery medium with the current communication media used by the company enables the designer to share the information whenever s/he needs it in his/her presentations (Sleeswijk Visser, 2009). Also such ability maintains a unity in team's communication which is a crucial issue in collaborative design (Bartocci, Potts, & Cotugno, 2008; Blomberg & Burrell, 2008; Erickson, 1998; Hughes, O'Brien, Rodden, Rouncefield, & Viller, 2000). The designer can take screenshots from the system to utilize it in his/her presentations in order to support design decisions. Moreover if features such as "bookmarking" are added to the system, it enables the design team members to share or exchange bookmarks in a collaborative design processes.

- **Qualities of the information that the system delivers**
  - Multidimensionality

Multidimensionality of information is a typical quality for user research studies, since they usually involve multiple perspectives from diverse users and multiple variables related to each comment made by each user. While delivering the findings it is important to reflect this multidimensionality. In this system multidimensionality is targeted to be achieved by providing hyperlinks for each product component and perceived quality in the explanation boxes in Figure 13 and 18, so that the designer can explore all related parameters regarding these components and qualities. Moreover by representing relations between perceived qualities through Neighborhood Trees and egocentric networks regarding each quality, it is aimed to reflect this multidimensionality.

  - In-depthness

In-depthness of information delivered as the outcome of user research enables designers to understand users and empathize with them. If informativeness is aimed for the system design, it should deliver in-depth information without reductivity. In this system, through layering information with certain levels, the content can be explored in detail by reaching even the minor comments of the users.

  - Sustainability

User research is considered as a valuable asset for the design process and future studies of the firm since it contributes to corporate memory and knowledge of the firm. Therefore sustainability of the information is considered as an important quality of a user research study (Ramey, Robinson, Carlevato, & Hansing, 1992). Achieving this quality depends on maintaining overall qualities of the system. Ease of access, concrete exemplification, prioritization, conciseness and informativeness are all critical for endurance of the information that the system delivers. In this study, these qualities are aimed to be met for maintaining the sustainability of the knowledge acquired through the user research task.

CONCLUSION AND DISCUSSIONS FOR FUTURE STUDIES

Positive feedback is received from the designers who utilized the system in their design processes. It is commented that the system successfully conveys multidimensional data with its interactive structure in a way that it opens up new possibilities for the designer. The system is found capable of enduring for future projects of the firm and considered as an important contribution to the knowledge database of the firm.

The system for user research information delivery should be designed peculiar to the cases. However, requirements that are outlined in the paper can guide design of future communication mediums of user research findings delivery. By presenting this interactive information system to the audience of professionals, it is aimed to develop it further for the future communications of user research findings. The system is open to such new possibilities since it is presented in both at micro level by highlighting its crucial features and macro level by pointing out the requirements considered while developing the system. It can also be considered for different contexts other than user research on perceived qualities, such as presenting research outputs regarding macro level approaches for radical innovations or findings that can support emerging approaches such as possibility driven design. Moreover the system can be developed as a major infrastructure for the user research database of the firm, which is hardly managed and can constitute a tremendous value for corporate memory.

ACKNOWLEDGMENTS

METU/BILTIR-UTEST Product Usability Unit is the sole owner of all rights in the methodology and design of the information system presented in this paper. The original content of the information system belongs to the collaborating firm, for this reason the content is blurred or fictional findings are presented in the figures of the paper. The authors would like to thank the researchers Pelin Atasoy and Armağan Karahanoğlu for their invaluable contribution to the project that is presented in this paper.

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LEADING
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DON'T FOLLOW THE CROWD TO PAYING MORE FOR LESS

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Consumers use product information, such as product design, and other features to evaluate a product and make purchasing decisions. My research explores the role that pooled attractiveness of a design can play on preference when products are presented with standard or advanced features. Three experiments demonstrate that product design and descriptions presented to the consumer contribute to consumer preferences. Consumers use design cues to estimate the product's perceived quality, which further influences preferences. Consumers use the presented information on features to make inferences. We see that when consumers are asked to conform, they prefer less attractive products paired with standard features or more attractive products paired with advance features. Implications of this research are discussed in this paper.

Keyword: Product Design, Consumer Preference, Uniqueness

INTRODUCTION

"*Nothing is beautiful, only man: on this piece of naiveté rests all aesthetics, it is the first truth of aesthetics. Let us immediately add its second: nothing is ugly but degenerate man_ the domain of aesthetic judgment is therewith defined."* – Friedrich Nietzsche.

The recognition of aesthetics in the external world causes emotions to rise with beauty and diminish with ugliness. We all strive to possess what we think are beautiful objects. However, the appeal of the aesthetics of a product is subjective. Our selection of design for an accessory, a personal vehicle, or piece of furniture is a reflection of what we identify within ourselves. The origins of aesthetic appeal are within us. Nietzsche notes that "*[i]n the beautiful, man posits himself as the measure of perfection; in special cases he worships himself in it. . . . At bottom, man mirrors himself in things; he considers everything beautiful that reflects his own image: the judgment 'beautiful' is the vanity of his species"* (Conway, 1997).If uniqueness is a quality with which we distinguish ourselves, then is it possible to evaluate product perceptions with individual's uniqueness as a moderator?

Whether it is a photographic representation of a product on the website of an online retailer, a video clip of a product on television, or the actual form and feel of the product, aesthetics go a long way in driving a consumer's preference. The aesthetics of the product is one criterion that a consumer uses to gauge if he or she likes the product and is willing to invest in it and make the product a part of his or her everyday environment. Certainly there are other considerations that consumers use to evaluate the desirability of a product, such as technology, usage, and convenience. Our focus in this paper is on the aesthetic cues of a product featured in print, online, or by the physical presence of the product.

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Research in design and marketing has looked at different implications of design in industry. The influence of a product's visual cues on its success has been studied (Crilly, Moultrie, & Clarkson, 2004). The value that design creates in the product design process has been studied. Product design evaluation can influence an investor's decision to invest in companies (Aspara, 2011). We know that product design contributes to the financial success of a company (Guo, 2010) and is well worth putting resources into. Real-world examples of companies that prioritize design initiatives in their strategies include Apple, P&G, and Hyundai, and this strategy often prevents companies from competing on price alone. This paper focuses on the process of design in which designers and product managers invest and on the realities of product development.

As designers, it helps to have a plan or process for a design in place. Stolterman (1994) named two methods of design: the guideline approach and the aesthetic approach. While the guideline approach assumes a prescriptive design process, the aesthetic approach assumes that a designer is only guided by his or her values and ideals and that the approach is focused on the product. Regardless of the approach assumed, the design process can be subjective. How design is perceived by the consumer is an important outcome both for designers and companies determining the next line of fashion trends.

In this paper, I outline potential underlying frameworks that can be useful in understanding how a consumer perceives product design and the inferences that he or she makes from the design of a product. I elaborate on the framework of perceptual fluency that consumers adopt in determining what makes a design attractive. I then discuss three studies conducted in a lab to test the influence that product design has on consumer inferences about the product. Finally, I discuss the implications of these studies for designers and product managers in bridging the gap between subjective taste and a unified marketing approach.

THEORETICAL FRAMEWORK

Evaluating how a design is perceived by a consumer can be a tricky process. A common practice in industry is to gauge consumer insights by using focus groups in test markets. This informs the design team's understanding of a consumer's design perception. This is one way to listen to the voice of the consumer and is reliant on the time and place that the product's design is evaluated. However, on a conceptual level, identifying a theoretical framework that outlines consumer preferences in product design can be useful in channeling initial assumptions of aesthetics in a product category.

Bloch (1995) outlines for marketers an abstract model that describes how the form of a product relates to a consumer's psychological and behavioral response. A consumer's view of design and inferences about the product has important marketing implications. Consumers view products they possess as an extension of themselves (Belk, 1988). Individuals attach meaning to their possessions; they also impose their identities upon their possessions, just as their possessions impose their identities on individuals. This possessive thought extends to "objects of aesthetic appeal" (Belk, 1988). Given the vast implications of a product's aesthetic form, it is no wonder that a designer's input on shape, proportions, materials, and color (Kellaris &Kent, 1993) can influence consumers' decisions to invest on the product.

Marketing literature offers at least three frameworks to understand a consumer's view of appeal in product design, also referred to as the styling or aesthetics of the product. One way to look at what consumers find appealing is to examine product design from a hedonic point of view (Berlyne, 1974). Any stimulus capable of evoking consumer attention just by its form is categorized as hedonic appeal. Attention is obtained by product novelty, contrast in the form or other design tactics such as the use of bright colors or contrast in shapes or scale to the comparative consideration set. The underlying framework to understand a hedonic response is that attracting a consumer's attention causes the consumer to view the product favorably. Attention does not

instigate a cognitive or an evaluative process. Attention is preference. Design of the product evokes a gut-level response devoid of cognitive interference.

As shoppers, we all know that this oftentimes is not the case. While attention can be the outcome of design, attention ought to cause a favorable response, but it does not always bring about one. Response to a product's design can be cognitive. If the design of a product is indeed evaluated during the initial interaction with the product, a consumer might find the product appealing due to the influence of fluency or prototypicality. Reber, Schwarz, and Winkielman (2004) articulate the role that fluency plays in aesthetic judgments of products. Simply stated, perceptual fluency is the ease of physically identifying a stimulus. Product designs that have obtained classic or iconic status because of their form fall under this framework, as do products that resemble designs of one's possessions or the possessions of those in one's social group. An example of perceptual processing fluency that manifests in advertising is the silhouette of a Porsche in a magazine. Just the silhouette of a familiar form communicates the brand to a consumer without the use of semantic or any other cues. The form is arguably identifiable by someone who has seen a Porsche only a few times. Visual cues of the form evoke recognition of a familiar form, which further aids brand recognition.

Prototypicality is a result of fluency in processing. Prototypicality, unlike perceptual fluency, is caused by conceptual fluency. Conceptual fluency causes ease of mental operations concerned with the stimulus. Prototypicality is connected with semantic knowledge structures that a given design can imply (Veryzer, 1995). A prototype is a form that each consumer associates with a particular product category. When we mention the word "watch" or "bicycle," the terms cause consumers to visualize particular forms that are associated with semantic knowledge structures associated with the words. The typical form that the consumer automatically associates with a product is the prototype of the product.

While perceptual fluency is concerned with recognition, conceptual fluency is concerned with mental operations that pertain to the meaning or categorization that the design holds. In this study, I examine product attractiveness as a pooled estimate of what a group of individuals consider to be attractive. We did not measure the typicality of each product but the appeal that each design holds for the consumer. This pooled estimate represents perceptually fluent stimuli that respondents recognize as attractive.

UNIQUENESS

The pooled attractiveness of a product represents a design that we can associate with popular design that gets many "likes" on a social network or retailer site. However, the objective of this study is to evaluate how individuals respond to a stimulus that is extremely popular versus stimuli that are not as popular. As indicated in the introduction, individual differences of uniqueness that consumers exhibit is of importance in this research. The individual trait of uniqueness stands for a consumer's self-distinction in a social group and is of concern in this research. We know that similarity promotes social acceptance, liking, and influence. However, differences can lead to social rejection (Brock, 1965; Schachter, 1959), but Snyder and Fromkin (1977) have argued that uniqueness can be a source of both personal and social benefit. Snyder and Fromkin (1977) posit that individuals seek moderation in their views of self-distinction, as extremes can be unpleasant. We know that individuals high in uniqueness are less prone to situational factors and make rational and independent choices. However, individuals vary in this trait, and we would expect individuals high on uniqueness to exhibit a stronger preference to more attractive products. The influence of this trait on preferences for attractive versus less attractive products remains unknown. The role that uniqueness plays on feature preference has also not been studied.

In this paper, I focus on the attractiveness of product design. In each experiment, a pretest was conducted using 40 designs of the product highlighted in the study to determine the most attractive and the least attractive stimuli. The design with the highest mean was assigned as the high design

stimulus, and the design with the lowest mean was assigned as the low design stimulus. Two sets of features corresponding to the product tested were also pretested. The standard features were replicated from product descriptions on online retailer sites. The other set of product descriptions were embellished with words such as “advanced” or “superior” and worded to indicate that the features offered more than the standard features. All pretests conducted were between subjects, i.e., subjects in one condition did not see the stimuli presented to subjects in the other conditions. Significant differences between the high and low stimuli in both the design and feature dimension was ensured in the pretests. In each experiment, I evaluated a consumer’s willingness to pay as an indication of preference for the product. Uniqueness is a trait and can be measured. We do so in experiment 2 outlined below. Uniqueness can also be a motivator, and in experiment 3, we assign subjects to various conditions in which the subjects are motivated to be unique or to conform. This manipulation was similar to the studies performed by Cheema and Kaikati (2010).

EXPERIMENT 1

In this study, my goal was to test whether the level of attractiveness of a design and the level of features described would affect preference for the product. The product selected for this experiment was a bicycle. The results of the pretest as articulated above were used to create questionnaires for this study. Results of the study confirmed the hypothesis that consumers preferred a more attractive design to a less attractive design. Consumers also preferred advancef features to standard features. We further found that not only did consumers estimate a higher preference for a better design, but their preference was higher for standard features paired with a more attractive design than for advanced features paired with an unattractive design.

EXPERIMENT 2

In this study, I wanted to evaluate the mediating role of quality perceptions as they influence preference. The product selected for this experiment was a cordless mouse. Pretests for design and features were conducted as before to determine the stimulus for the study. My goal was to evaluate the way that quality perceptions were informed by the level of design and features and to evaluate whether these perceptions inform preference. I also wished to evaluate how an individual’s sense of uniqueness influences this process.

Perceived quality mediated the effect of design on preferences. This was moderated by the features of the products. In the advance features condition, consumers utilized design cues to determine an increased preference for the product. In instances in which the features were standard, we saw a significant mediation of quality inferences on preference. Furthermore, we saw that individuals preferred less attractive products when asked to be unique and preferred more attractive products when asked to conform.

EXPERIMENT 3

To increase understanding of why consumers who were asked to conform preferred a less attractive design, I conducted a third experiment. In this experiment, the product studied was a wristwatch. As a priming mechanism, I asked one group of individuals the importance of conforming and another group of individuals the importance of being unique. Analysis of the data indicates that design, features, and uniqueness level interact to inform quality perceptions. Findings in this study indicate that individuals asked to be unique had higher quality inferences for attractive designs paired with advance features and unattractive designs paired with standard features. Individuals asked to conform had an increased quality inference for less attractive designs but only when paired with advance features, and feature distinction was not made with attractive designs. The less attractive design with standard features and the more attractive design with advance features were perceived as higher in quality.

Furthermore, when we analyze the effects on preferences, we find that an individual's uniqueness level plays a critical role. For individuals asked to conform, design and features had a significant interaction with the way that uniqueness affects preferences. Findings in this paper also indicate that for individuals motivated to be unique, there was a marginal impact of design on preference.

DISCUSSION

Intuition would suggest that, in general, attractive products and advance features are preferred. However, we find that cues on the product, packaging, or website that provide visual or verbal information can have an impact on the quality estimates of a product. The three studies in this paper explored the underlying mechanisms of how consumers evaluate products and the role of our subjective motives on product preference. Uniqueness can be a predisposed trait or can be evoked. The three studies outlined above evaluate decision processes in consumer culture during which product aesthetics is used as input for decisions of purchase.

This research indicates that more attractive designs are preferred by consumers. Design informs perceptions of quality, and this further influences preference. If standard features are presented to consumers, the quality of the product is inferred from design cues. However, if advanced features are present in the product offering, perceived quality does not inform preference. This study indicates that individuals who are asked to conform use quality inferences in determining their preferences. More attractive designs paired with advanced features and less attractive designs paired with standard features are preferred by individuals primed to conform. Given that individuals who are motivated to be unique can have subjective interpretations of design, it makes sense that the findings in this paper indicate marginal support for a design's influence on preference in the high uniqueness condition.

IMPLICATIONS FOR THEORY AND PRACTICE

This paper builds on existing design literature by offering competing frameworks from a consumer's perspective to interpret aesthetic appeal. Furthermore, this paper focuses on a single conceptual model of perceptual fluency that informs the aesthetic judgments that consumers make in product evaluations. The paper also looks at the critical role of subjective consumer predispositions in the form of uniqueness as it informs product evaluations. By focusing on uniqueness, this study provides a platform to ground consumer subjectivity using motivations of uniqueness useful in contexts of self-value, social validation, cultural norms, and other situational factors (Ames and Iyengar, 2005).

Design and trend managers face challenges of creating new and improved aesthetics for new seasons, and changing trends. They need to consider the overall aesthetic appeal of their products as a constant compass in meeting marketing goals. The research outlined in this paper informs general management of the design process by articulating areas of product considerations that consumers use to determine preferences. Consumers are faced with evaluating trade-offs, and the technical and price considerations of a series of product offerings certainly keep consumers preoccupied in shopping aisles or on retailer websites. This study makes the case that aesthetic and visual considerations of a product's positioning provide valuable cues that consumers consider in purchase decisions. Conditions of individual dispositions or those imposed by a situation can influence the way we evaluate products. Product managers and retailers orchestrating product lines that define a consumer's consideration set can seek pointers to establish comparable choice alternatives to the consumer.

FUTURE RESEARCH

Future research can explore the role of other frameworks that aid the establishment of aesthetically appealing products for the consumer. The role of conceptual fluency in establishing product form in

set categories and its influence on consumer response can be studied. Different reactions of the consumers such as liking, product love, purchase intentions, interest, and word-of-mouth as generated by design aesthetics can be explored. Another extension of this research is into the role of arousal and novelty in the way that it influences preferences.

CONCLUSION

In conclusion, this study provides valuable insights to designers and marketers in the way that we view consumer evaluations of products with different levels of popular appeal. Certainly we see that popular designs on the shelf are preferred, but the critical findings of this study articulate the importance of the level of features and design cues to make inferences. Finally, as Nietzsche asserted, it is within each of us to make aesthetic evaluations. A sense of one's individuality reflects preferences and trade-offs in evaluations of everyday possessions.

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Xi, J. (2012). *Evaluating Functional Performance in Small-scale Public Demountable Buildings.*

EVALUATING FUNCTIONAL PERFORMANCE IN SMALL-SCALE PUBLIC DEMOUNTABLE BUILDINGS

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This paper introduces a PhD project which aims to propose a multidisciplinary evaluation method for demountable buildings that addresses the issues of environment, social responsibility and economic effects. Public use demountable buildings fulfil many temporary needs, such as non-emergency transitional schools, ephemeral exhibitions and seasonal entertainment. They differ from static buildings in various ways, mainly due to the users' needs for adaptability, mobility and flexibility. The hypothesis is that the existing evaluation methods from related areas can be adapted and applied to small-scale public demountable buildings. A specific evaluation method that applies to public demountable buildings can then potentially be adapted to other types and scales in future research.

Keywords: evaluation; demountable; building

INTRODUCTION

Demountable building has been defined as:

> *…those that are transported in a number of parts for assembly on site. They are much more flexible in size and layout and can usually be transported in a relatively compact space. They have some of the limitations that site operations bring to a conventional building and, depending on the size, complexity, and ingenuity of the system, are not as instantly available.* (Kronenburg, 2002: 10)

Similar to demountable buildings, demountable structures are often used for public events. These structures include: pavilions, temporary seats, shelters, media facilities and stages. The boundary between demountable buildings and structures becomes blurred when structures can provide the same functional use as a building. It becomes important however, to identify whether a project is a building or functional structure when construction law needs to be addressed for installation and deconstruction guidance

Small-scale projects are flexible in function and adaptable in structure. They require; low budgets, small working teams, small building sites and most importantly the ability to be assembled and dismantled in a relatively short period of time. Small-scale projects can encourage design innovation and be useful for design experiments. Analysing them can help to improve understanding of the design of all buildings.

The author decided to focus on public buildings for several reasons. i. Universality; The majority of contemporary demountable buildings are for public use, despite a considerable range of demountable residential shelters and temporary houses. ii. Diversity; Public use demountable

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buildings fulfil many temporary needs, such as; non-emergency transitional schools, ephemeral exhibitions and seasonal entertainment.

The purpose of examining functional performance is to assess whether the requirements of the design have been achieved. The value of this research is therefore the establishment of a set of relevant criteria as a systematic evaluation option enabling project operators to begin to address functional performance from a public perspective and reflect on the scope of their projects.

RESEARCH METHODS

The research methods include: literature review, case studies, field research, interviews, questionnaires and focus group discussion.

The literature review has been divided into two parts. The first part briefly discusses the history of demountable buildings, covering a wide range of building types, including portable and relocatable building types. The second part is consisted of two steps. The first step explores contemporary existing demountable buildings to establish a set of criteria covering the key factors of design and operation. The second step explores existing analysis/evaluation methods that have been successfully implemented to collect empirical information.

The author has selected case studies from three companies in this research. These are: Chengdu Hualin Elementary School - designed by Shigeru Ban Architects from Japan in 2008; Exxopolis - designed by Architects of Air, a company based in Nottingham, UK, with twenty years of experience in designing and constructing inflatable structures; and, KREOD, a multi-functional structure designed by young architect Chunqing Li, which will be exhibited during the London 2012 Olympic Games and dismantled by the end of summer for other exhibitions. These three case studies have been used as a research strategy to test the research hypothesis. They have been selected because of: i. their appropriacy for the research topic (small-scale public demountable building); ii. their approachability, which means the author has interviewed the designers and received a positive response from them; iii. having three case studies is more powerful than focusing on a single case. The context of these cases studies differs from each other, which helps the author to draw conclusions objectively. The author analysed the case studies through four aspects – function, finance, timescale and aesthetics, which have been concluded in the second part of literature review.

Table 1 Case studies comparison

Project Name	Client	Designer	Function	Type of Architecture	Location	Date of Implementation
Chengdu Hualin Elementary School	Chengdu Hualin Elementary School	Shigeru Ban Architects (Shigeru Ban, Yasunori Harano)	Specific function – school building (non-commercial)	Building	Chengdu City, Sichuan Province, China	08/2008
Exxopolis	Various	Architects of Air (Alan Parkinson)	Multi-function (commercial	Inflatable structure	Various	Various (started from 1992)
KREOD	Various	Li Investments Ltd (Chunqing Li)	Multi-function (commercial)	Flat-pack structure	Various (currently limited in UK)	Various (started from July, 2012)

The author visited the buildings, construction site and company workshops in order to obtain first-hand information from the case studies. The author participated as a volunteer to help with construction to explore the building site and events directly.

The author has used an unstructured interviewing strategy to interview professional groups, including researchers, architects, designers, event organisers, construction organisers and

volunteer students. The unstructured interviews were conversational and were used to receive qualitative information.

The author used a structured interviewing strategy for building users to receive both quantitative and qualitative data and information. The structured interviews were specific and offered interviewee a range of answers.

The author administered questionnaires to participants identified through the case studies to obtain quantitative data and qualitative information from the building/structure visitors.

Focus group discussion will be arranged towards completion of the research with a group of researchers based both in academia and in practice, from various disciplines to discuss the author's research topic. The purpose of arranging focus groups is to identify research limitation and address further research questions through critical discussion.

KEY FACTORS IN THE DESIGN AND OPERATION OF PUBLIC DEMOUNTABLE BUILDING

Stephen A. Brown (2001) states, in his book Communication in the Design Process that the four subdivisions of architecture briefing are function, finance, timescale and aesthetics. The author has adapted this basic frame to small-scale public demountable buildings in order to analyse their design and operation.

FUNCTION

Yona Friedman (2000: 111) writes: "The style of a building consists in its users. An unused building is nothing else than a ruin." Friedman (2000: 104) states in his essay 'Function Follows Form'; "function, for architects, is a mechanistic concept; how should a building be used? The function of each architectural space is determined, first of all by the equipment specific for that space: furniture and fixture."

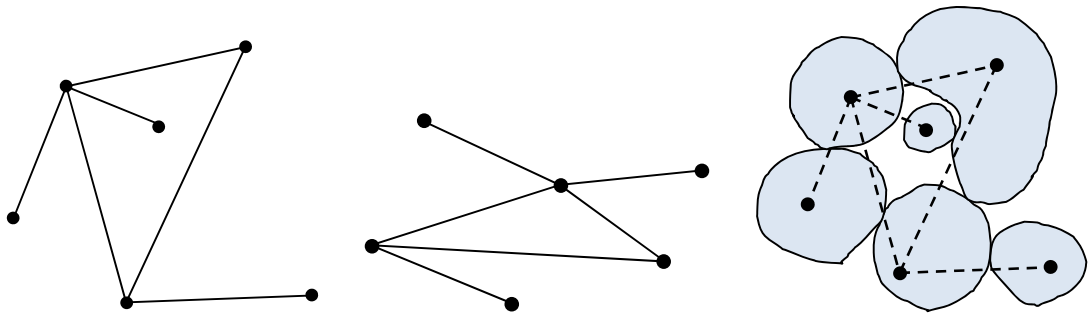

Figure 1-3 From left to right: Linkage scheme; Topologic Transformation of a linkage scheme; The dual of the linkage scheme

Source: Yona Friedman, Function Follows Form. (2000)

Friedman further argues that for architects, the functional points can be understood as points in a linkage scheme. Graphs can be used for mapping a linkage scheme, for example, nodes representing specialised equipment and lines being the paths to link these specialised spaces (Figure 1). He explains that a graph is a topological figure which has no definite form and which can be deformed in many different patterns (Figure. 2). Friedman concludes that function can follow any form when it is mapped by a graph (Figure 3).

It has been concluded that:

> *…the functional aspect of the environment for human activity will involve the provision of shelter; privacy; arrangement of the contents for a particular purpose; activity control visually and physically; the removal of adverse conditions, such as noise, cold, heat and*

> *technical considerations involved in the provision and control of natural and artificial conditions.* (Isaac, 1971: 70)

The author argues that in small-scale public demountable buildings, the most commonly examined aspects by architects and designers, when they design for functions, are spatial comfort and usability.

Similar to other building types, the consideration of spatial comfort, referring to small-scale public demountable buildings, is linked with anthropometrics, ergonomics, ability and disability, circulation spaces, activities, furniture arrangements and storage considerations.

Usability has been defined by ISO in terms of certain products. It is stated in Annex A, (Informative) Concept of functionality and serviceability in ISO 11863:2011 Building and Building-Related Facilities - Functional and User Requirements and Performance - Tools for Assessment and Comparison (International Standards Office, 2011: 12) as; “a product of manufacture, made in quantities of identical products, such as a computer terminal, should meet the functional requirements of its users.”

The question is whether the definition of usability in the context of manufactured products can be also applied to buildings in general and more specifically to demountable buildings.

As stated in Annex A of 11863:2011 (International Standards Office, 2011: 12): “If buildings are also considered as tools or aids to users, then the concept of usability also applies, though unlike manufactured products, each building or building-related facility is unique at least in its physical location and typically in many other features as well.” Referring to small-scale demountable buildings therefore, usability is: how convenient it is for the clients to host activities inside the buildings and how easy it is for the building users to participate in these activities.

Usability can be measured; the purpose of which is to obtain feedback from the users for architects, designers and stakeholders for further evaluation. The usability of a demountable building is often measured by analysing the efficiency of users’ navigation by way of observation, interviews and surveys. This method of performing usability measurement relies heavily on qualitative analysis which includes formal and informal interviews in person, by telephone or via the internet.

FINANCE

Ezra D. Ehrenkrantz (1989: 65) writes: “the cost of buildings should be dealt with at three different levels: i. the cost of the building proper, ii. the cost to build the physical plant, iii. the cost to allocate for space, environment, services and finishes.” When evaluating the functional performance of a demountable building, it is essential to consider all costs incurred during its lifetime. In demountable buildings, the ‘cost of the building proper’ includes construction materials, components, building machinery and tools. The ‘cost of physical plant’ includes the hiring of construction workers, design service, operation and the transportation of building elements or components. The ‘cost for allocation’ includes: renting or occupying the building site, (indoor or outdoor), administrative services and allocating waste building materials. In addition to these three levels, costs of demountable buildings include those of dismantling the building and storing and transporting its components for future use.

Demountable buildings can be dismantled and reconstructed quickly and economically. Demountable components can however, cost more than fixed components because of: i. the additional cost of acquiring a design which is flexible and adaptable, ii. the additional cost of their specialist manufacture.

Generally, the scale of a demountable building is a key aspect in controlling its finance. For example, a smaller scale building will require less material and therefore cost less in this aspect. Further ways to help reduce costs include re-using the building elements. The key characteristic of a demountable building is that most of its components can be dismantled and re-constructed in

whole or in part. If they have been maintained in a good condition, the elements that make up the components can be re-used many times rather than being abandoned or recycled.

An efficient method of cost reduction is the use of local materials to reduce material transportation costs. An example is that of Shigeru Ban's Nomadic Museum, which was constructed from steel shipping containers and paper tubes and which travelled from New York to Santa Monica and then to Tokyo. At each building site, the majority of the containers used were from the local area. Only small numbers of containers were retained for the transportation of other construction materials such as paper tubes. The containers used for transportation were then re-used as construction elements.

A further possible method of cost reduction is to apply multiple functions to limited space. For example, circulation space can also be used as exhibition areas or reception.

Whole-life costing is a useful tool for estimating the best cost option for the life of a building and, according to William Fawcett (2003), is used as an essential foundation for sustainable design. It means that when comparing alternative strategies for constructing a project, the cheapest appearing alternative may not be the most economical over the longer term. Whole-life costing can often show that a durable and efficient building, despite higher construction costs, is, in the longer term, better value and more sustainable than a more cheaply built design with high running costs.

Reducing building costs alone does not necessarily make a building economically sustainable. If a demountable building has been built for commercial purposes, it may offer faster payback and commercial benefits for the project owners in comparison to static buildings. If there is not sufficient payback or commercial benefits, the building is therefore not a successful project. The author argues that 'finance management' not only refers to reduction (material, costs, transporting and construction time), but also to growth. Growth includes improving the quality of the buildings' functions and usability, and improving quality of life, (for example by engaging with the local community). Growth can also mean creating increasing opportunities for commercial benefits for future projects.

TIMESCALE

Timescale is the duration of the project. Referring to the research topic in this thesis, it includes: design, construction, use (by events operators and visitors), deployment and transportation.

Design - Small-scale, public, demountable buildings can be designed in a relatively short time, especially when the design does not rely on high-technology.

Construction - Depending on the availability of materials and the construction team, small-scale public demountable buildings can be built in a short time (from less than half an hour to one month).

Use - Unlike residential demountable buildings, public demountable buildings are often used for a short time (often during the daytime, but sometimes in the evenings for special occasions such as live music or concerts).

Deployment - The fundamental premise for a demountable building is the breaking down of a building into its individual elements so that they can be transported from one building site to another or to storage place(s). The speed of deployment can be faster than construction. If, for example, the building is going to be re-used without any changes to its design and if the components can be transported whole, it is often not necessary to dismantle the building completely.

Transportation - Chosen transportation methods may restrict the unit size of building elements, as permitted transport dimensions may not be exceeded. It is imperative that the building elements be properly secured during transport and protected against possible damage en-route. Normally, individual units are combined to produce appropriate transport loads. High-quality building elements are often transported in steel containers, in which they are particularly well-protected. For long-distance deliveries, rail and sea transport are economical solutions, (the last stage of delivery

to site is generally made by truck/van). Delivery by air is usually only practical for extremely inaccessible sites due to high cost and weight restrictions.

Some demountable buildings will be completely reconstructed following redeployment. Some demountable buildings will be partly re-used and some will be entirely recycled. Through the study of existing projects, the author analyses the entire life cycle of a demountable building within the three scenarios: i, all building elements will be re-used, ii, a quantity of the building elements will be re-used, and iii, all building elements will be recycled.

All building elements will be re-used - Following use, and according to specific needs, some demountable buildings are immediately redeployed and some will be transported for temporary storage before being used or exhibited again. The difference is that the buildings which require storage incur additional transportation time and cost compared to those which are directly transported to the next building site.

A quantity of building elements will be re-used - In some circumstances, it is not necessary to re-use the entire building. For example, where clients expect new designs or if it is more cost-effective for stakeholders to recycle some building parts. It is also possible that some building elements cannot be re-used due to damage or because they are made from low quality materials which will not withstand a further use. In these cases, some elements are abandoned by the project directors at the end of the deployment.

All building elements will be recycled - Sometimes, it is most efficient to recycle the entire building. Instances of this scenario include those where the first design is not considered successful or where the project owner does not need to keep the design. The reason can also be a limited budget or transportation limitations.

A timescale and clear objectives are normally established and agreed during the architectural briefing process. Herein the project overview needs to be broken down into manageable tasks. This helps to classify the tasks required and identify the relationships between each work package before establishing what will be required to complete each task. Risk and uncertainty may also be revealed during this process. Gantt Chart, Microsoft Excel and Network Analysis Software such as Mind Genius can be used to aid architects and project managers to schedule realistic tasks in order to achieve the design objectives.

AESTHETICS

The author summarises that the aesthetics of demountable buildings can be understood from the three aspects of visual appearance, acceptability by the users, and appropriateness at the building sites.

VISUAL APPEARANCE

The author summarises that the visual appearance of demountable buildings is determined by the combination of scale (large, medium, small), construction system (modular, flat pack, tensile, pneumatic and combined systems), material (wood, bamboo, paper, natural fibre, metal, plastic, glass, concrete, gabion), colour and illumination at different percentages (Figure 4).

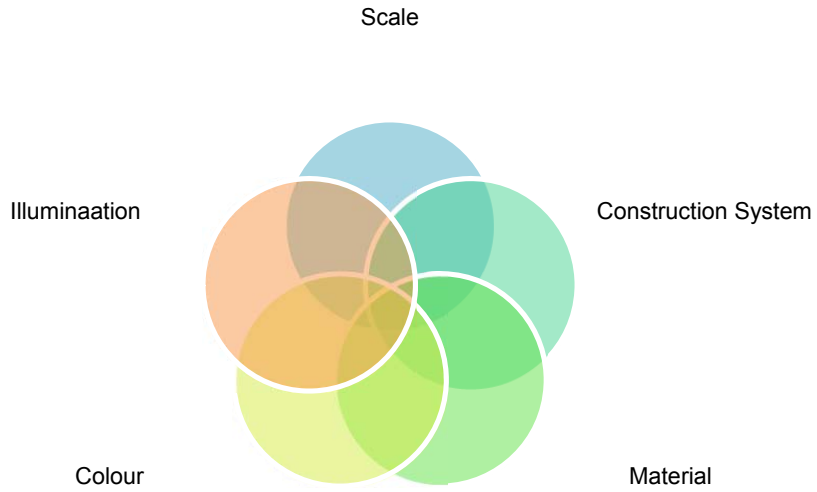

Figure 4 The aspects of visual appearance in demountable buildings

ACCEPTABILITY TO USERS

The assessment of 'building friendliness' is decided by its acceptability to the users, which means how well the design of the building is accepted by people psychologically. Generally, architects have tools (simulation software, monitoring equipment) to measure the physical performance of buildings. However, there are no 'tools' to measure 'building friendliness'. This 'friendliness' can instead be measured through psychological experiments. Roger M. Wools (1970: 48-55) discovered and tested two ways to carry out psychological experiments: through a simulated environment or through a real building.

Acceptability to users leads to the satisfaction of users, which means that if the functions of the building are acceptable, then it is pleasant to use the building. 'Satisfaction of users' has been used as an indicator of a building's serviceability, and of when to give priority to resolving problems within it.

The author summarises: i. 'Building friendliness' is partly determined by how well the activities in this building are organised. Although this is generally beyond the measurement of the architect or designer, a good design should enable organisers to effectively operate their events inside the building, thereby helping to offer visitors a pleasant building experience. ii. The user time in a demountable building is relatively shorter than in a static building. It might be difficult to receive effective feedback from users because they may need a longer building experience time to establish potential problems. iii. Demountable buildings often face varying user groups. The cultural differences of users can lead to a building being accepted well in one location, not being accepted so well in another location.

APPROPRIATENESS AT THE BUILDING SITES

Most demountable buildings are temporarily constructed within a permanent site. Generally, they are built in open spaces with easy access, such as parks, car parks, harbours, and sometimes inside a large building. James A. LaGro (2008: 265) summarises three types of open space. These are: conservation open space, developed "hard" open space and developed "soft" open space.

Conservation open space generally means green land. It is a natural environment which provides an organic aesthetic amenity impression for visitors.

Developed "hard" open spaces (plaza, promenade, courtyard) and developed "soft" open spaces (lawn, garden, park) are built environments

Table 2 Open Space Types Summarised by James A. LaGro (2008: 265)

Open Space Types		
Conservation open space	Developed “hard” open space	Developed “soft” open space
Woodland	Plaza	Lawn
Grassland	Promenade	Garden
Water	Courtyard	Park

Apart from open spaces, there are also small, relatively restricted, informal spaces in urban areas which can be used to construct small-scale demountable buildings. In Tokyo for example, architect Yoshiharu Tsukamoto found that there are small buildings between streets, along widened roads and in the spaces between tracks and streets. Most of these buildings are built at a low cost, are not spectacular in design, and have not required cutting-edge technology. Yoshiharu Tsukamoto named this type of buildings “pet architecture”. Much ‘pet architecture’ is built as small retail, hairdressing and property agencies. Some ‘pet architecture’ is entirely demountable and its temporary existence became a tool for Yoshiharu to use to explore how towns and cities have been developed through time.

Apart from open space and informal space, another key fact concerning the sites of demountable buildings is that, often heavy foundations are not required due to the light weight nature of many demountable buildings (some demountable buildings require a concrete foundation).

Demountable buildings are surrounded by natural environment, built environment or both. The existing environment provides standards for designing new buildings and sites in the vicinity. Contextual issues concern material choices as well as the sizes and proportions of buildings and other site elements. A well-chosen open space can strengthen a demountable building’s identity and provide additional value such as a pleasant environment conductive to more active activities. The arrangement and positioning of a demountable building not only depends on the availability of the construction space, but also depends on the position of the surrounding existing buildings. The key relationship between a demountable building and its static background is that the users are aware of the temporality of the demountable building and the motionless of its background. Therefore the users create the criteria of how well the demountable building is perceived. This indicates the importance of users’ opinions for the following research.

REVIEW AND SYNTHESIS OF ANALYSIS AND EVALUATION METHODS

Currently, there is little documented and practical evaluation or analysis method specifically designed for demountable buildings. The author found out through research (interviews with designers of demountable building) that most of the designers tend to evaluate their projects through experiences obtained from previous similar projects or static building design. In the past, a variety of standards, principles, software, and multidimensional methods originally designed for other purposes have been used in part for demountable buildings. Those methods are categorised into three groups: *construction law*, methods that do not offer certifications/recognitions and methods that offer certifications/recognitions.

The author used book Construction Law Handbook, written by Allen, Richard K., Stanley A. Martin, and Robert Frank Cushman in 2009, as a reference to identify relevant and authoritative legislation to demountable buildings.

The methods do not offer certifications, and recognitions, such as UNCHS (Habitat) Guidelines for the Evaluation of Post Disaster Programmes, have been taken as a framework to evaluate rehabilitation interventions in human settlements. Temporary Structures in Historic Places (Guidance for Local Planning Authorities, Site Owners and Event Organisers) by English Heritage and Temporary Building Design Guide by Aberdeen City Council have also been modified for use in demountable building design, and they were specially designed for this. Software such as

ASPIRE (A Sustainability Poverty and Infrastructure Routine for Evaluation), IES (Integrated Environmental Solutions), and DesignBuilder have also been implemented as evaluation tools.

The methods offer certifications or recognitions such as ISO (International Organization for Standardisation) Standards, such as ISO 14000, have been written for environmental protection systems. Assessment systems such as LEED (Leadership in Energy & Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method), and CASBEE (Comprehensive Assessment System for Built Environment Efficiency) have been used for providing practical and measurable green building framework, in addition to more specific methods and guidelines, such as CASBEE for Temporary Construction Criteria.

These evaluation and analysis methods belong to various different technical fields and scientific disciplines such as economics, different branches of engineering, structural technology, architecture, and town planning.

The results of evaluating functional performance in small-scale public demountable building can be seen from two parts: a self-assessment and a method to select appropriately.

A SELF-ASSESSMENT

The idea of a self-assessment is based on Frederick William Mueller's (1986) calculation method to calculate the performance ratio: the performance ratio = actual quantity/planned quantity. The author argues that although this calculation method was first proposed to evaluate the cost performance of projects, it can be adapted and used by the architects and designers as an easy self-assessment for post-evaluation.

$$\text{The functional performance ratio} = \frac{\text{actual quantity}}{\text{planned quantity}}$$

Table 3 Function Quantity Assessment Value

Function Quantity Assessment Value		
Value	**Score**	**Meaning**
0	0.2	Very weak
1	0.4	Weak
2	0.6	Acceptable
3	0.8	Good
4	1.0	Very good

For the self-assessment of architects and designers they are first given a Planned Quantity Assessment Checklist to rate each criteria and they mark each criteria with a value from 0 to 4 (Table 3). The average value is then counted and translated into a score between 0.2 and 1.0 as a planned quantity. The architects and designers mark the actual quantity if they have the required information according to the criteria. Consequently, an actual quantity assessment is not necessarily to be carried out by a researcher or consultant who was not involved in the design and construction process. Although in this research, the actual quantity assessment was carried out by the author in the three case studies - Hualin School, Exxopolis and KREOD Pavilion.

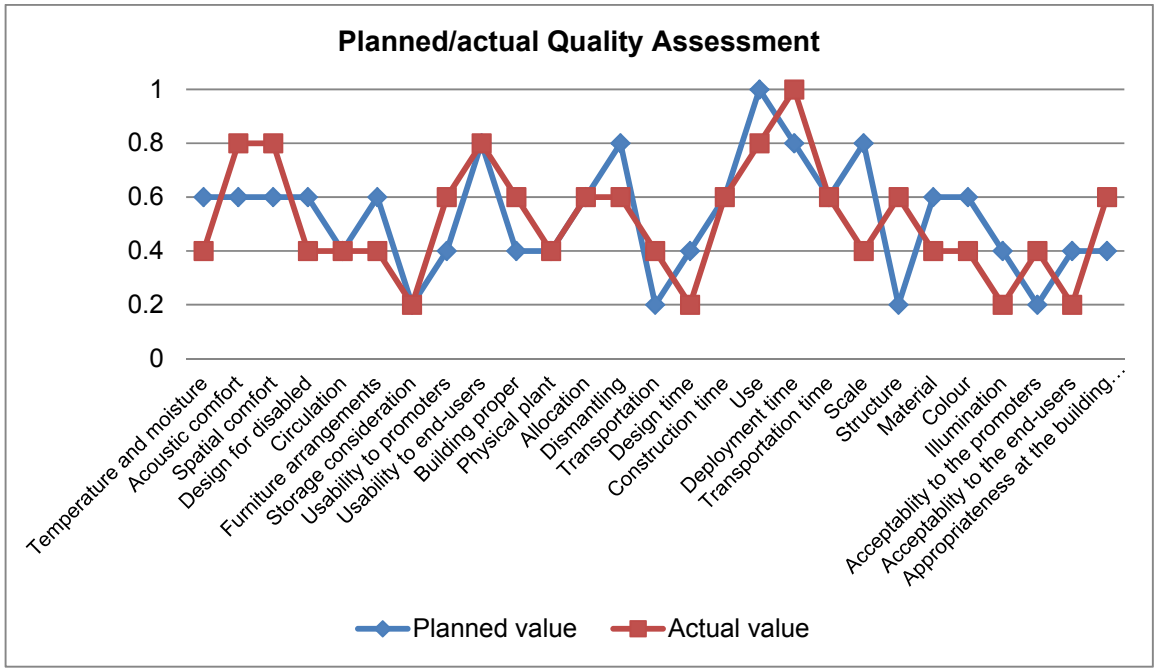

Figure 5 The planned/actual quality assessment (a possibility)

SELECTING APPROPRIATE EVALUATION METHODS THROUGH THE ANALYTIC HIERARCHY PROCESS

Thomas Satty writes:

> *…the Analytic Hierarchy Process (AHP) is a basic approach to decision making. It is designed to cope with both the rational and the intuitive to select the best from a number of alternatives evaluated with respect to several criteria. In this process, the decision maker carries out simple pairwise comparison judgments which are then used to develop overall priorities for ranking the alternatives. The AHP both allows for inconsistency in the judgments and provides a means to improve consistency.* (Satty, 2001: 1)

The author applied the Analytic Hierarchy Process to choose evaluation methods from: law and regulations, methods do not offer certifications and method offer certifications. This method of application can be used by the designers and the owners of small-scale public buildings to rank their optional evaluation methods, based on their initial intention of the design proposals. In this decision making model, the project goal is to access the suitability of evaluation methods for evaluating the functional performance of small-scale public demountable buildings. The criteria are the four aspects: function (A), finance (B), timescale (C) and aesthetics (D) that have been concluded in the literature review. The alternatives are: law and regulations, methods offer no certifications and methods offer certifications. In this process of decision making, the author carried out simple pairwise comparison judgments which are then used to develop overall priorities for ranking the three alternatives. According to Thomas Saaty (2001), there are nine levels in the intensity of importance when each two criteria are being compared (1 – equally importance, 2 – weak, 3 – moderate importance, 4 – moderate plus, 5 – strong importance, 6 – strong plus, 7 – very strong or demonstrated importance, 8 – very, very strong, 9 – extreme importance). The author selected level 1, 3, 5, 7, 9 from the intensity of importance because of the importance is not necessary to be compared at two levels in this case.

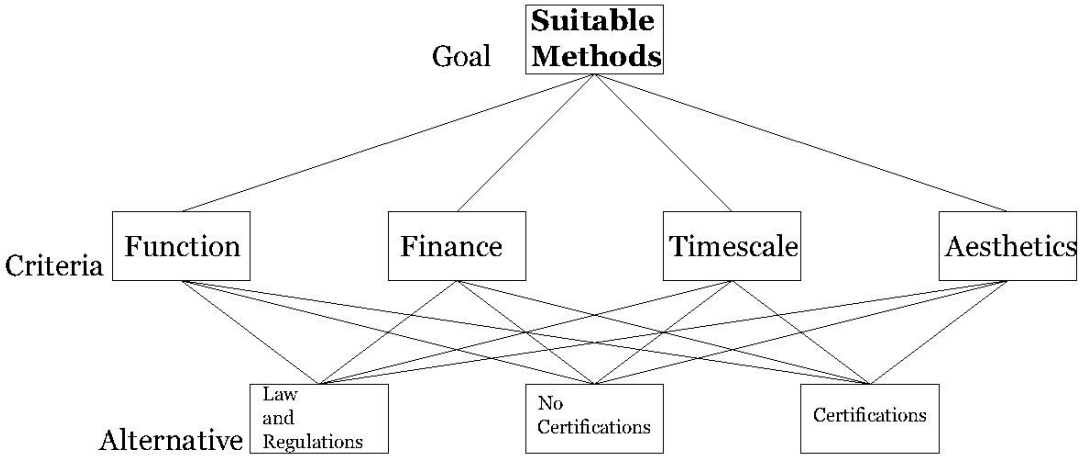

Figure 6 A three level hierarchy – goal, criteria, alternative

When pairwise compare all criteria, the results of each comparison can occur five unique possibilities. They are; 1: the two criteria are equally important; 3: the importance of the first criteria over the second criteria is weak; 5: the importance of the first criteria over the second criteria is strong; 7: the importance of the first criteria over the second criteria is very strong; 9: the importance of the first criteria over the second criteria is extreme.

SCENARIO 1

Step 1

The first step is to determine the weight (priority) to be given to the four criteria in the decision process. Suppose A is considered to be weakly more important than B, and C is considered to be strongly more important than A, D is considered to be extremely more important than A. Suppose C is considered to be strongly more important than A, and C is considered to be extremely more important than B, equally important to D. D is extremely more important than A, strongly more important than B. This scenario the author created means, suppose function is considered to be weakly more important than finance, and timescale is considered to be strongly more important than function, aesthetics is considered to be extremely more important than function. Suppose timescale is considered to be strongly more important than function, and timescale is considered to be extremely more important than finance, equally important to aesthetics. Aesthetics is extremely more important than function, strongly more important than finance.

	Column A	Column B	Column C	D
Row A	1	3	1/7	1/7
Row B	1/3	1	1/7	1/5
Row C	5	7	1	1
Row D	7	5	1	1

Compute the relative priorities of the criteria. Technically speaking, this is computing the principle Eigenvector of the matrix – and there are a number of different algorithms for doing this with different levels of mathematical complexity and accuracy. The following represents a good compromise between complexity and efficiency. Normalise each column, i.e. divide each element in a column by the sum of the elements in that column. Hence:

	Column A	Column B	Column C	D
Row A	0.075	0.187	0.085	0.061
Row B	0.025	0.063	0.061	0.085
Row C	0.375	0.438	0.427	0.427
Row D	0.525	0.313	0.427	0.427

Take the average of each row, yielding the column vector representing the priorities:

A	0.102
B	0.059
C	0.417
D	0.423

Step 2

The second step is to determine the relative performance of the evaluation methods against the criteria. The author rated the relative performance of each route under each of the four criteria (function, finance, timescale and aesthetics) in turn. This way again done by a sequence of pairwise comparisons. Thus, taking function (Criteria A) first, draw up a matrix.

The author estimated that, when evaluating function, 'methods do not offer certifications' is very strongly better than 'law and regulations', 'methods offer certifications' is strongly better than 'law and regulations' when evaluating function. 'Methods do not offer certifications' is weakly better than 'methods offer certifications'. Hence, the completed matrix might be:

Criteria A Function	LR	NC	C
LR	1	1/7	1/5
NC	7	1	3
C	5	1/3	1

(LR= Law and regulations; NC= Methods do not offer certifications; C= Methods offer certifications).

Again, divide each element in a column by the sum of the elements in that column, the results show as:

Criteria A Function	LR	NC	C
LR	0.077	0.097	0.048
NC	0.538	0.678	0.714
C	0.385	0.226	0.238

Analysing the matrix as above yields a column vector representing the relative function performance of the evaluation method:

A	
LR	0.074
NC	0.644
C	0.283

Taking finance (Criteria B) second, the author estimated that, when evaluating finance, 'methods do not offer certifications' is weakly better than 'law and regulations', 'law and regulations' is weakly better than 'methods do not offer certifications' and 'methods do not offer certifications' is strongly better than 'methods offer certifications'. Hence, the completed matrix might be:

Criteria B Finance	LR	NC	C
LR	1	1/3	3
NC	3	1	5
C	1/3	1/5	1

Again, divide each element in a column by the sum of the elements in that column, the results show as:

Criteria B Finance	LR	NC	C
LR	0.231	0.217	0.333
NC	0.692	0.652	0.555
C	0.077	0.130	0.111

Analysing the matrix as above yields a column vector representing the relative function performance of the evaluation method:

B	
LR	0.260

NC	0.633
C	0.106

Taking timescale (Criteria C) thirdly, the author estimated that, when evaluating timescale, 'methods do not offer certifications' is strongly better than 'law and regulations', 'methods offer certifications' is weakly better than 'law and regulations', 'methods do not offer certifications' is weakling better than 'methods offer certifications'. Hence, the completed matrix might be:

Criteria C Timescale	LR	NC	C
LR	1	1/5	1/3
NC	5	1	3
C	3	1/3	1

Again, divide each element in a column by the sum of the elements in that column, the results show as:

Criteria C Timescale	LR	NC	C
LR	0.111	0.130	0.077
NC	0.555	0.652	0.692
C	0.333	0.217	0.231

Analysing the matrix as above yields a column vector representing the relative function performance of the evaluation method:

	C
LR	0.106
NC	1.438
C	0.260

Taking aesthetics (Criteria D) at fourth, the author estimated that, when evaluating aesthetics, 'methods do not offer certifications' is weakly better than 'law and regulations', 'methods offer certifications' is very strongly better than 'law and regulations', 'methods offer certifications' is strongly better than 'methods do not offer certifications'. Hence, the completed matrix might be:

Criteria D Aesthetics	LR	NC	C
LR	1	1/3	1/7
NC	3	1	1/5
C	7	5	1

Again, divide each element in a column by the sum of the elements in that column, the results show as:

Criteria A Function	LR	NC	C
LR	0.090	0.053	0.106
NC	0.272	0.158	0.149
C	0.636	0.790	0.745

Analysing the matrix as above yields a column vector representing the relative function performance of the evaluation method:

D	
LR	0.083
NC	0.193
C	0.724

Combine the performance of evaluation methods into a single matrix, thus:

	A	B	C	D
LR	0.074	0.260	0.106	0.083
NC	0.644	0.633	1.438	0.193
C	0.283	0.106	0.260	0.724

Determine the overall ranking of the evaluation methods. Multiply the performance matrix by the priority vector

$$\begin{bmatrix} 0.074 & 0.260 & 0.106 & 0.083 \\ 0.644 & 0.633 & 1.438 & 0.193 \\ 0.283 & 0.106 & 0.260 & 0.724 \end{bmatrix} \times \begin{bmatrix} 0.102 \\ 0.059 \\ 0.417 \\ 0.423 \end{bmatrix}$$

The final rankings for each evaluation method are thus given by a three element column vector:

LR=0.074×0.102+0.260×0.059+0.106×0.417+0.083×0.423=0.102
NC=0.644×0.102+0.633×0.059+1.438×0.417+0.193×0.423=0.784
C=0.283×0.102+0.106×0.059+0.260×0.417+0.724×0.423=0.450

The final results suggest that 'methods do not offer certifications' is highest ranked, followed by 'methods offer certifications', with 'law and regulations'. This indicates that in this scenario, 'methods do not offer certifications' is the best choice when evaluate the functional performance of small-scale public demountable buildings. The above final result that obtained from the demonstration was one of the possibilities, depending on who ranks the criteria (function, finance, timescale, and aesthetics) and alternatives (evaluation methods).

ADAPTING EXISTING EVALUATION METHODS THROUGH CASE STUDIES

The question consists in how various methods might be transferred and adapted between different strategies to make a valid assessment. This leads to investigating case studies with existing methods, by identifying which the best approach that could be applied.

Figure 7 – 9 From left to right: Inside the classroom; Outside the classroom; The courtyard space between the classrooms
Source: Junjie Xi. (2010)

The magnitude measured as 8.0 earthquake struck in Wenchuan, China on 12th May 2010 killed 69,000 and left 4.8 million people homeless. Shortly after the earthquake, Japanese architect Shigeru Ban arrived in Wenchuan with architect Hironori Matsubara and a building consultant from Beijing to propose a temporary residence house design to the local government. The laboratories from Japan and professors from Faculty of Architecture Southwest Jiaotong University quickly came to an agreement and started to work together for the design. They first assembled a full size model of a residence dwelling in the campus of Southwest Jiaotong University and took the proposal to the local government. But for many reasons such as lack of previous experience in China using paper as a building material, it was not achieved. Instead it was suggested by a local NGO - Rebirth of Environment to apply the idea to build temporary classrooms for the Hualin Elementary School. Once approval came from education officials, a team was set up including students from Ban's laboratory in Japan, Hironori Matsubara Lab at Keio University SFC, along with volunteer teachers and students from around China. The aim was to erect temporary but resilient schools out of plywood and recycled cardboard tubes before the new term started in September. Ban has vast experience working with recycled paper, which has earned him a reputation as the 'paper architect'. He has used paper tubes in the past to design shelters following earthquakes in India, Turkey, Japan and Sri Lanka. One of the chief strengths of Ban's design is that it employs relatively inexpensive and widely available materials to achieve a structurally sound proposal. The funding bodies include Chengdu Education Bureau and other donations such as Rebirth of Environment, which donated 100,000 RMB (15704 USD). The project budget was 580,000 RMB (91084 USD), the actual cost was around 680, 000RMB (106789 USD).This is not suitable for wide spread implementation. This project is the first school to be made of a paper frame structure in China and it has increased an awareness of transitional shelter design. Importantly, it encouraged communication between the architects, architecture students and

volunteers from Japan and China, thus supporting architecture education and also offering new graduates an opportunity to putting theory into reality.

Table 4 Chengdu Hualin Elementary School case study research methods

Case Study Research Methods							
Literature	**Interviews**				**Questionnaire**		
	Name	**Role in the Project**	**Method**	**Date**	**Group**	**NO.**	**Date**
'Voluntary Architects' Network', Shigeru Ban: Paper in Architecture', 'Shigeru Ban: Complete Work: 1985-2010'	Yasunori Harano	Designer and volunteer organiser (Japanese side)	Skype	11/09/2010 20/11/2011	Pupils	373	23/11/ 2010
	Hong Yin	Volunteer organiser (Chinese side)	In-person (Chengdu, China	26/11/2011	Teachers	20	
	Jing Deng	Volunteer organiser (Chinese side)	Phone	15/10/2011	Volunteer students	35	11/2010
	Liu Hou	Volunteer students team leader (Chinese side)	In-person (Chengdu, China)	23/11/2011			
	Xiaodu Liu	The head of the NGO - Rebirth of Environment	In-person (London, UK)	27/04/2012			
	Mr Li	School Leader	In-person (Chengdu, China)	23/11/2011			

As previously discussed, the method the author used to analysis case studies has two steps. The first step was identifying a list of specific research questions and the second step was seeking answers to those questions through literature review, interviews and questionnaires. Based on the data has been obtained through research, the author proposes the assessment results as Figure 10 below. The functional performance ratio has been counted between *acceptable* and *good*.

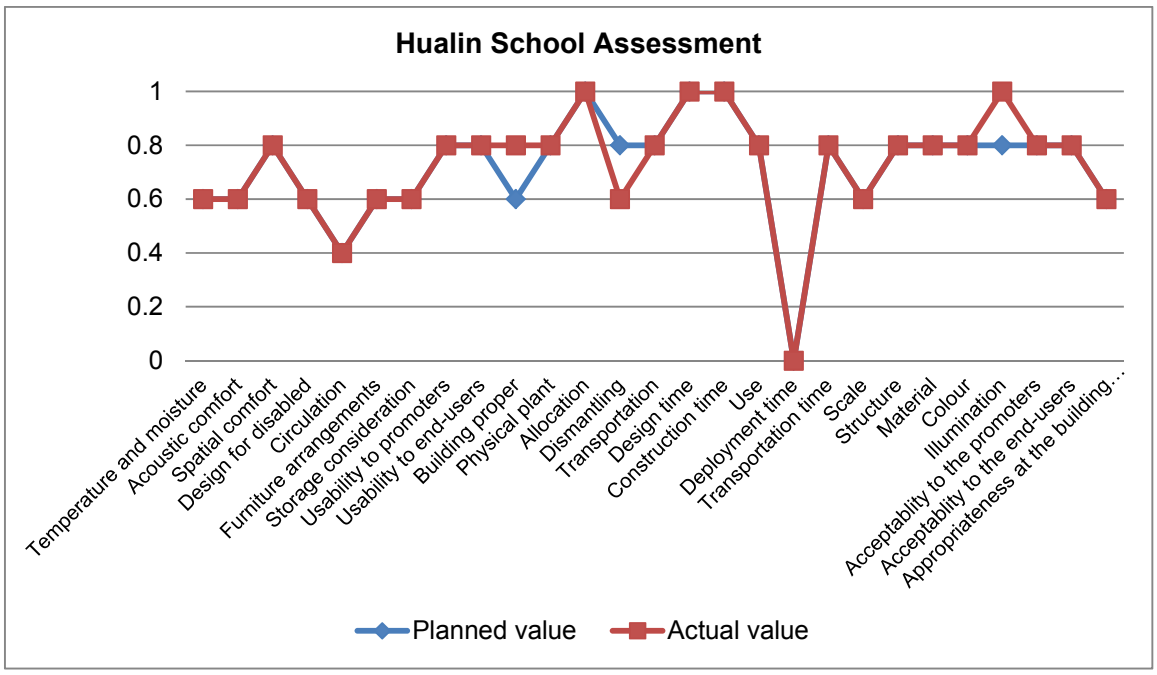

Figure 10 The Chengdu Hualin Elementary School case study assessment (an subjective assessment)

CONCLUSIONS

The argument is that the evaluation methods for small-scale public demountable buildings can be varied and numerous. The key is that the selected methods need to reflect the architects or designer's design intention from a specific perspective. An evaluation method which applies to public demountable buildings can then be potentially adapted to other types and scales of demountable buildings in future research. Currently, the author's evaluation system for demountable building is limited in recommendations and selection from existing methods. In further research, focus will be placed on developing the theory into a practical computer based tool, such as evaluation software, which can be used by architects or designers easily for a comprehensive evaluation. Another interesting argument that has risen here is that demountable building can be used to explore urbanisation in the future. This is because public demountable buildings often require an open space with easy access, and this emphasises the importance of public space in cities. Researchers from multidisciplinary backgrounds such as civic design and urban design can map the changes of cities not only through static, but also through transportable buildings, therefore measuring the movements of cities and people.

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LEADING
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BENCHMARKING DESIGN: MULTIPLYING THE IMPACT OF TECHNICAL ASSISTANCE TO MSMES IN DESIGN AND PRODUCT DEVELOPMENT

Federico DEL GIORGIO SOLFA*

National University of La Plata

This work takes as challenge-level exploratory study in the importance, scope and dimensions of the benchmarking of product design for the state advisory in design and product development for micro, small and medium producers.
The initiative falls as the zero phase of the project made for the Admission to the Research Career of Scientific and Technological Research Commission of the Province of Buenos Aires (CIC-PBA), which is under evaluation.
Our approach comprises the sub-national policies and actions to support micro, small and medium industries (MSMIs).
This study allows us to glimpse how benchmarking can contribute design-in a system of institutional support for technical assistance MSMIs based and network-to new product designs multiply their effects.

Keywords: Benchmarking design; product development; MSMIs

INTRODUCTION

Benchmarking is a management technique, comprising a continuous process of measuring products, services and technologies for production of a particular organization, for comparison with a model organization (leader or exemplary). Has been widespread and used in the private sector, although in recent years, specific applications are being made in the public sector.

In the last decade, different governments of Europe and America are developing successfully integrated applications benchmarking methodologies in different thematic areas of public sector areas, businesses, utilities, universities, science parks, and so on. From its use in most developed countries, has become a basic component of the regulatory processes and provision of public services.

The results obtained from application of benchmarking in the public sector, have shown a development of better services and more efficient organizations with environments.

Therefore, we assume this work, which aims to make this particular perspective of the art of benchmarking and exploratory study-at-the importance, scope and possible dimensions of benchmarking design, for technical advice to state in MSMIs Province of Buenos Aires.

METODOLOGY

This exploratory study is based on the presentation of the ways existing theoretical concepts of benchmarking, we consider the benefits and features of your application, we analyze the particularities of the public sector and in a logical and synthetic route, it evaluates its application in the Province of Buenos Aires, describing a proposed operation in the structure of the CIC.

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The proposed actions are divided into two main parts: 1. the technical assistance in design and product development, and 2. The Bank of Successful Projects in Industrial Design and Design Benchmarking Network.

After the definition of benchmarking design, the main conclusions are drawn.

DEVELOPMENT

BENCHMARKING: THEORY AND APPROACHES OF THE AUTHORS

Originally the term –Benchmark- comes from the topography means a surveyors mark made on a rock or a concrete post, to compare levels. Benchmarking is a term that was originally used by surveyors to compare elevations. Today, however, benchmarking is a more restricted to the management lexicon, with the benchmark of best practice (Kouzmin et al., 1999).

Benchmarking appears in the U.S. in the late seventies, from Xerox to the need to understand and overcome their competitive disadvantages. Subsequently, other companies were highlighted with benchmarking: Ford, Alcoa, Millken, AT & T, IBM, Johnson & Johnson, Kodak, Motorola and Texas Instruments, thus becoming almost mandatory for every organization wishing to improve their products, services, processes and results.

The term benchmarking is attributed to the release of Camp where the application comes from Xerox, as a technique of self and search for best practices in order to improve the quality of their processes (Camp, 1991). This publication coincided with the distinction of National Quality Award Xerox Malcolm Baldrige, who got his quality leadership from benchmarking techniques. The award, included in its assessment, the implementation of updated and the development of benchmarks, one of the early stages of what is now considered benchmarking (Czuchry et al.,1995).

Commonly in the business sector, is known to benchmarking as a technique to meet competition and changes in processes, products or services to be more competitive, from the experiences of the leaders surveyed. Different authors define benchmarking as a process of benchmarking, continuous and systematic inter-organizational processes, products and services to implement improvements (Spendolini, 1994).

Benchmarking is an independent management strategy that integrates a set of techniques evolucionadamente quality. Therefore, it is also a technique of management innovation (Clemente & Balmaseda, 2010).

Bruder & Gray, defined as: "a rigorous and practical to measure the performance of your organization and processes, in contrast to the best organizations of its kind, both public and private, and then use this analysis to improve services, operations and situation costs dramatically." (Bruder & Gray, 1994:9).

Fischer (1994:3) defines benchmarking in terms of performance measurement: "Through a series of performance measures-patterns known as 'benchmarks' [benchmark] - a person can identify the best in class between those who perform a task in particular. Then, best practices are analyzed and adapted for use by others who want to improve their way of doing things. ".

For Pfeiffer (2002), benchmarking is not a simple comparison of indicators of an organization with another organization or with other ideals, especially not, when performed only once. It is important to compare the values derived from processes throughout the organization, continually comparing and always seek better solutions, the goal is –the learning organization-.

APPLICATION BENEFITS

The organizations are using benchmarking for different purposes. Some lie to benchmarking as part of an overall process that seeks to improve the organization. Others view it as an ongoing mechanism to keep updated (Spendolini, 1997).

This technique is very efficient for improvement in organizations, and that can be incorporated and adapted processes whose effectiveness has been proven by other organizations. For this reason, it helps organizations to make improvements quickly.

Furthermore, benchmarking is a relatively low technology, low cost and fast response, that any organization can adopt. It also seems to have enough common sense to make it easy to understand for both officers, directors, employees, suppliers, customers, and for the media and general public (Cohen & Eimicke, 1995; Cohen et al., 2008).

Typically, an organization in an attempt to identify the best in its class and duplicate or exceed their performance, you can also integrate their culture and behavior, a strong competitive spirit, pride, confidence, energy and effort improvement (Cohen & Eimicke, 1996).

Innovation is one of the direct benefits obtained from benchmarking practices and has direct impact on the ways of doing, from the incorporation of new ideas about a problem, ideas or specific applications.

BENCHMARKING IN THE PUBLIC SECTOR

According to Marchitto (2001), who has researched, developed and implemented in Italy on benchmarking in the public sector, argues that to the public, this technique may offer the right to appropriate the role of producer welfare for the community, restoring efficiency and efficacy.

In the public sector, benchmarking can be defined as the continuous and systematic process by which government-from a thorough in-depth analysis phase, individualized areas for improvement and carry out internal and external comparisons, in order to: integrate shares common objectives, consistent with the overall objectives of the State; get the cooperation between the network, in order to provide increased value to recipients, and planning to make improvements (Marchitto, 2002).

TYPES OF BENCHMARKING

For Camp (1991), there are four types of benchmarking: internal, competitive, functional and generic. Instead, Spendolini (1994) categorizes three types of benchmarking: internal, competitive and generic (functional), grouped in one category to the generic and functional benchmarking.

The internal benchmarking focuses on the comparison of internal actions to identify the best processes of the organization. The competition identifies and collects information about processes, products and services in direct competition, for comparison with our own. The generic, identifies and collects data in the same way that competitive, but other organizations that may or may not competitors.

From another perspective, can cross at these types of benchmarking (internal, competitive and functional) with other characteristics, determining the strategic, if you look at objectives, goals and organizational vision, or operational, if the research focuses on the tasks more specific and operational.

Additionally, Marchitto (2001) proposes a classification especially adapted for the civil service and is based primarily on the differentiation process: operational and strategic management.

APPLICATIONS OF BENCHMARKING IN THE PROVINCE OF BUENOS AIRES

In previous work, we surveyed and analyzed various applications benchmarking tool in the public sector through international organizations, national, subnational and local (Del Giorgio Solfa, 2011).

In the provincial public sphere, different organizations currently applying the technique of benchmarking for improvement and institutional development. In this sense, the policy applications as benchmarking, joint actions can be cross-regional and sector (Plaza Tesías et al., 2005).

In turn, these actions can be grouped into two basic types of dimensions: 1. Government support (internally); 2. Support for private organizations (external environment).

In the Province of Buenos Aires, the possible use of benchmarking at the State level includes all the Provincial Public Administration (central, decentralized and self-sufficient). According to its purpose, can incorporate benchmarking, both for the development of their own organizations and for support of other public, private or mixed, that may be subject to its regulations, controls or policies.

Under this approach, the Ministry of Production, Science and Technology could build and manage networks aimed at benchmarking and productive economic development of regions and / or production organizations (e.g. MSMIs).

Specifically, the implementation of provincial regionalization policies, benchmarking with the control board, constitute the most appropriate set of tools for monitoring the management and development indicators, as a way of assessing the impact that various policies in each region.

To facilitate these actions, from the perspective of the whole production policies-the Ministry of Production, Science and Technology benchmarking could implement policies, supporting MSMIs from:

- Development of a bibliography and methodology of benchmarking.
- Establishment of networks of provincial benchmarking (in materials production).
- Survey and systematization of technical assistance to industries.

From these actions, and particularly from the permanent disposal networks, methodologies and results achieved with the technical assistance, micro and small industries could learn, evaluate and implement best management practices in their industry (both organizational as product) systematically incorporating benchmarking between its processes.

BENCHMARKING DESIGN IN THE ORGANIZATIONAL STRUCTURE OF THE CIC

In Currently, CIC is the organization of the Ministry of Production, Science and Technology, Buenos Aires, which is responsible for promoting research and providing technical assistance through its various research centers.

Among its twenty-six centers, rescue Industrial Design Center (IDC) -created by agreement with the National University of Lanus- which acts on the translation that makes the CIC, on policies issued by ministerial portfolio.

The CDI investigation, is assisting and advising the seat MSMIs with Buenos Aires, but by its strategic geographical location and involves mainly the territorial patches of the following industrial sectors (OPPA, 2001):

- Clothing.
- Leather, footwear and leather goods.
- Furniture and parts.

Understanding that the CDI is the most immediate operational core of public policy, in research and industrial-design assistance that is targeted to the industries of strategic dimension, is that we consider as most suitable to incorporate and develop benchmarking activities.

TECHNICAL ASSISTANCE IN DESIGN AND PRODUCT DEVELOPMENT

The technical assistance MSMIs, form, in terms of industrial design, require significant resources and professional endeavors.

On the other hand, considering that these public policies, in the form of technical assistance, can not respond in a timely manner, increasing and varied demands of design and development of new products, we feel obliged to propose creative solutions to reach the as many productive organizations.

Also, from the standpoint of public administration responsible, we owe a commitment to use resources on a basis that allows us to capitalize on the present and future, the different experiences that are acquired in the processes of technical assistance in industrial design.

It is then, under this approach, the technical assistance and take a more important dimension, with the multiplier effect of digital media.

In this logic, also fits the idea that government should not assist technically in "black box" and get involved in the generation of competitive differences between companies.

Therefore, these proposed technical assistance, will endure, transparent and easy arrival to producers, is expected to collaborate with more uniform sectoral developments.

THE BANK OF SUCCESSFUL PROJECTS INDUSTRIAL DESIGN AND DESIGN BENCHMARKING NETWORK

Within the Commission, proposed the creation of the Bank of Industrial Design Successful Projects (BPE-DI) and Benchmarking Network Design.

The BPE-DI, with a smart search system, will capitalize on CDI's technical assistance in benchmarking actions undertaken.

The idea of forming a Benchmarking Network Design, which integrates the various MSMIs interested aims: to support and produce synergies cross (within and between sectors) work together (networking), facilitate the search for benchmarking partners, and assist in improving indicators of design management and new product development (Del Giorgio Solfa, 2001).

The BPE-DI and Benchmarking Network, would form a solid core to share successful experiences and find-in-industrial design at the provincial level.

DESIGN DIMENSIONS OF BENCHMARKING

The application of benchmarking of product design or simply benchmarking design, requiring different dimensions and indicators set design, which allows them to be measured and compared with other products.

Although these findings may somewhat complex and include more dimensions, we show in Table 1, we define groups in an exploratory way:

Table 1 Some dimensions of Benchmarking Design

A. Market
A.1. Price
A.2. Target
A.3. Date of entry into the market
A.4. Average life
A.5. Positioning
A.6. Sales volumes
B. Technology
B.1. Number of parts
B.2. Material / s.
B.3. Quantity of each material
B.4. Production processes
B.5. Production scale
B.6. Standardized parts
B. Dimensions
B.1. General: height, length and width
B.2. Parties: height, length and width
B.3. Anthropometric dimensions
B.4. Variable dimensions
C. Use
C.1. Physical ergonomics
C.2. Psychological ergonomics
C.3. Guarded
D. Maintenance
D.1. Cleaning
D.2. Repair
D.3. Spare parts
E. Recycling
E.1. Reuse rate
E.2. Environmental impact

Source: own.

CONCLUSIONS

In the first instance, review of benchmarking literature and the cases studied, we can conclude that it is a technique that can be perfectly applied to the CDI.

We emphasize, in the words of Camp: "The rationale for benchmarking is that it makes no sense to be locked in a lab trying to invent a new process to improve the product or service, when this process already exists." (cited in MAC, 2008:11).

On the other hand, we know that typically MiPyMIs must continually improve their products, focusing on the needs of citizens and the new challenges they face as a result.

It is in this instance, where the self-assessment, assists the CDI, the BPE-DI, Benchmarking Network Design and the subsequent comparison of productive organizations can play an important role. Benchmarking is presented as an opportunity to capitalize on the knowledge and developments that have reached other organizations throughout its existence. Perhaps its greatest benefit, is based on the discovery of new and better ways of doing things.

Course, you have to initiate a process of benchmarking involves making efforts by the organization in terms of: resource allocation, teamwork, sharing and finding information, and so on.

Therefore, the CDI, has a key role in implementing benchmarking pilot at the provincial level design.

With the ultimate aim of improving the capabilities of MiPyMIs and increase the quality of their products, we propose to revalue to make proposals for benchmarking and continuous implementation.

In short, we believe it is worth devoting resources to a benchmarking policy design in the Province of Buenos Aires. Because not only does not perceive problems, if we visualize important insights with your application.

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MAPPING THE DESING MIND

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As design thinking has gained prominence in the management discourse, attention has been paid to various components of the design thinking process. The subject of less scholarly attention in the design field, has been the idea of the "designer's mind." Research on the innovation process suggests that the mindset through which an individual frames a problem plays an important role in determining the kind of choices he or she makes. In this paper, we look across the fields of managerial cognition and psychology to examine various approaches to describing and measuring mind-set, hypothesize how these contribute to or inhibit design thinking practices, and report on a small initial trial of several instruments. We conclude with outline methodological challenges and opportunities that confront researchers in this area of design.

Keywords: Design thinking intervention; mind-sets; regulatory focus

OVERVIEW

As design thinking has gained prominence in the management discourse, attention has been paid to various components of the design thinking process: design research, ideation processes, and prototyping, for example. While clearly important, the subject of less scholarly attention in the design field, has been the idea of the "designer's mind." Research on the innovation process suggests that the mindset through which an individual frames a problem can play an important role in determining the kind of choices he or she makes. Because design thinking can be viewed, through one lens, as the selection of a particular kind of problem solving approach (characterized by empathy, iteration, optionality, for instance, as some of its key dimensions), developing a deeper understanding of the relationship of mindset to choice, and how this may change over time, represents a promising area for scholarly inquiry. In this paper, we look across the fields of managerial cognition and psychology to examine various approaches to describing and measuring mindset, hypothesize how these contribute to or inhibit design thinking practices, and report on a small initial trial of several instruments. We conclude with the development of a set of hypotheses about the kinds of methodological challenges and opportunities that confront researchers in this area of design.

BACKGROUND

Organizational scholars have long been interested in the effects of cognition and meaning making (Weick, 1979). The ways in which organizational actors interpret and construct their flow of experience has tangible effects not only for how they organize and coordinate their actions, but on their ability to innovate and create organic growth for their organizations. The study of emotions (Dane & Pratt, 2007), and empathy (Iacoboni, 2009) demonstrate that managers ability to connect with their stakeholders provide a foundation for value creation activities.

These new value creation opportunities are also fraught with ambiguity and uncertainty (Harting, Harmeling, and Venkataraman, 2006). Managers tend to avoid ambiguity (Curley, Yates, and Abrams, 1986), and uncertain situations spark conscious and deliberative cognitive processes to search for meaning and order (Proulx & Heine; 2009). The nature of the meaning that managers make has an impact on the kinds of behaviors they then enact – for example if a manager interprets a new situation as potentially threatening or risky she may avoid the situation or seek to minimize the risks associated with the situation; similarly, if she interprets the situation as a potential opportunity, she may act in ways which enable her to better take advantage of that situation (Dutton and Jackson, 1988).

Researchers in the field of psychology have also long been fascinated by the relationship of mindset to choice. Stanford Psychologist Carol Dweck (2006) in her work spanning decades focused on elementary school children identified what she called a “growth” mindset: the conviction that the world (including one’s own abilities) can be shaped and changed. This translates, she argues, into a view that life (and success) is all about learning. Because learning only occurs when we step away from the familiar, those with a growth mindset accept the uncertainty that inevitably accompanies any new experience – as a result, they actively seek them out.

In contrast, she argued that other children develop a “fixed” mindset and a worldview that life is a test where the object is not to get it wrong – and to thereby avoid looking “stupid.” Such children live their lives trying to avoid mistakes. Because moving into uncertainty leads logically to more mistakes, they avoid that too – and with this comes the avoidance of many new experiences.

These early differences in mindset set the stage for two very different patterns of choice, especially prominent when the environment is characterized by the presence of uncertainty. A willingness to risk failure is an essential characteristic of a design mind – without it, the kind of experimentation embedded in the design process becomes too uncomfortable and is avoided.

Columbia psychologist Higgins (1997) has developed a similar theory, arguing that individuals make decisions based on their proclivities toward managing uncertainty. Regulatory Focus Theory (RFT) posits that individuals’ motivations are guided two basic schemas: promotion focus or prevention focus. A promotion focus engenders the desire to take advantage of opportunities and not miss one, while a prevention focus is concerned with avoiding making mistakes. The promotion focus, on one end of the spectrum, with its aspiration to maximize gains is primarily centred on advancement, achievement and growth. Prevention focus, at the other end of the spectrum, is the need to meet immediate obligations and avoid shortfalls through highlighting protection, responsibility and safety.

Simply put, this self-regulatory system dichotomy informs what motivates people to align themselves more strongly with goals of either achieving aspirations while executing duties or avoiding penalties of making mistakes. A promotion focus puts attention on positive outcomes including learning, growth, and success, while a prevention focus highlights avoiding negative outcomes for example criticism, failure, and rejection.

Specifically, a promotion focus engenders the desire to take advantage of opportunities and not overlook them, also known as “errors of omission.” A prevention focus is concerned with rejecting decisions that prevent achieving expectations, or “errors of commission.” There is a tension between these goal setting modes because achieving aspirations requires action-oriented “growth” while avoiding “looking stupid” supports following the status-quo. Acting on opportunities demands decisions that will generate opportunities while preventing errors demands decisions that obscure opportunities. This difference between these two modes is strong enough that individuals chronically tend to make decisions in one mode over the other. Understanding this tension is useful for examining the interaction that design thinking has with mindsets that people adopt in operational settings because design thinking operates on both sides of the tension. For example, experimental research (Higgins & Crowe, 1997) indicated that a promotion focus generally

produced more task-oriented effort and subsequently more correct outcomes. Conversely, a prevention focus reduces error rates at the expense of the total correct outcomes.

TRADITIONAL BUSINESS SCHOOL CURRICULUM

Business school curriculum has an impact on managers' approach to making decisions, which is its purpose. Training in mainstream graduate and undergraduate programs teaches on analyzing the available data in order to derive correct answers for the given situations. The next step in the process is to execute based on that predicted correct answer (Pfeffer and Jong, 2002). Obviously this method has exceptional merit. However, this training engenders a mode of thinking and action prejudiced against executing first in order to generate data during the execution phase. Innovation is, by definition, exploratory in nature, and innovation skills can atrophy in an environment where intense analysis precedes action (Leavitt, 1989). Concentrating on finding correct answers typifies the prevention focus or analytical mindset, which implies that outcomes tend to mimic established expectations. Design thinking introduces the concept that developing correct answers emerge from collecting first-hand data through action. This approach typifies the promotion focus or a generative mindset that tend to lead to future outcomes that differ from the current reality.

Bringing a rigorous scholarly lens to the relationship between these mindsets and the operations involved in design thinking is the goal of this work.

MEASURING DESIGN THINKING AS A MINDSET INTERVENTION

Managers in companies have incentives to make vigilant decisions to prevent losses. Though, eagerness for opportunities converts uncertainty into value. The design thinking process can focuses mindsets along the promotion & prevention spectrum. The design thinking process prompts eager decisions early in the process and vigilant decisions later in the process. Uncertainty prevails at the beginning of the process and as certainty increases through (eagerly) gathering action-generated knowledge, the criteria for future actions become more salient, tangible and subject to rigorous (vigilant) analysis. Managers are well practiced making decisions using the prevention mindset at the expense of promotion mindset decisions. Modulating the regulatory focus across the decision-making and execution processes should have profound effects on the nature of the decision and the goals. Freidman & Förster (2001) found a correlation between regulatory focus and creativity, where promotion focus leads to increased effort and creative solutions. Given that correlation, creativity can be used as a supplemental proxy for regulatory focus states.

METHODOLOGY

The challenge we face as scholars is how to bring a more rigorous methodological framework to the study of the relationship between mindset and design thinking. We view this as a multi-step process. First, the challenge is to capture and characterize mindset in a defensible way. We hoped to do this by utilizing some of the well tested instruments already in use in the psychology field, and also by capturing students' self-reported changes by asking them to keep a journal as the class progressed. Once we had succeeded in developed confidence in our mindset measures, the second challenge would be to examine how different mindsets impact the choice of problem solving strategies. This second stage, would ideally involve more of a laboratory-focus, using scenarios to elicit responses from respondents. In particular, we hypothesize that the anxiety generated from fear of failure might be a good intervening variable to attend. Physiological measure, like saliva swabs, might be useful as part of stage 2.

As we began stage 1, we examined the availability of instruments. Dweck's tools for measuring mindset are unfortunately neither extensive nor reliable; Higgins, however, has spawned a great number of research protocols aimed at understanding how mindsets affect decisions. Using questionnaires in experimental settings, researchers have proven that individuals' short term regulatory focus is not fixed (Roney, Higgins, and Shah, 1995), and that, direct instruction can override the subjects' chronic proclivity to choose one mode over the other.

As a preliminary test of whether Higgins instruments might be valuable in measuring how mindsets change as result of exposure to and using design thinking methodology, we set up a pre-test/post-test situation to measure MBA students' regulatory focus before and after their exposure to design thinking. A small set of students, enrolled in a semester-long course introducing design thinking methods and providing practical experience applying the method, were used as our initial sample. Using established web-based questionnaires – Regulatory Focus Pride (Higgins et al 2001) and Regulatory Mode (Kruglanski et al 2000) – we assessed individuals both at the beginning of the course and at its conclusion.

REGULATORY FOCUS QUESTIONNAIRES

The assessments administered to students were uploaded to Qualtrics, an online survey tool used for commercial and academic research. The questions were mixture of self-report measures of openness toward ambiguous circumstances and less intuitive questions shown to indicate regulatory focus. Many of the questions' results were influenced by reaction time. The mixture of less obvious answers and reaction-time bias mitigated, but not eliminated, the influence of subjects seeking to match their responses with environmental and other expectations (Higgins et al 1997). The questionnaire also captured self-reported control data which included, gender, age, education level, marital status, household income, political affiliation and religiosity.

DESIGN THINKING COURSE INTERVENTION

The course introduced students to the design thinking process through classroom instruction. To reinforce learning the method, students worked in groups on current innovation problems projects allowing them to practice design thinking techniques on current corporate problems. The semester-long course differed in many substantive ways compared to the core MBA curriculum and other electives. The instructional materials were based on a research-derived toolkit (Liedtka & Ogilvie, 2011) that explains the design thinking methodology using concepts familiar to management students. The course extended beyond lecture styled interactions. The students were tasked with working in smaller teams with companies that submitted their "wicked" problems. Early in the semester, the students learned about their project and met via conference call or video with the company managers for the respective project. The students liaised with the company's project leadership throughout the semester and presented a final proposal as proxy for a final examination. The project forced the students to practice the theory of design thinking with a subject matter that was tangible, timely and relevant. Additionally, the students were required to journal their experiences and provide feedback about how their approach to view problems had changed throughout the training. The third author designed the course and taught it two times prior to this iteration.

RESULTS & DISCUSSION

The latency data were transformed using natural log. Interestingly, comparing the pre- and post-tests, we saw only one statistically significant difference in the psychometric Promotion Focus, Prevention Focus, and Locomotion variables. The difference between the ideally and actually possessing a promotion focus attribute is positively correlated with a promotion focus. That means that people wanting to have a promotion focus tend to have it. This was consistent both pre and post. There were no significant correlation between pre- and post- assessments and the number of students changing focus state.

This is surprising because faculty interacting with the students believe noticed a significant increase in design thinking capabilities during the progression of the class. Student self-report data, gathered through their journals, also indicated a belief in the increase in abilities and in having developed more of a "design mind." This left us with two hypotheses – either the Higgins instrument was not capturing aspects of the design mindset or the curse itself was produced no changes. We remain at work evaluating these two hypotheses. Overall, this small sample suggests

that a continued search for a valid mindset instrument is necessary before stage 2 can be explored.

CONTRIBUTIONS TO THE FIELD

These findings indicate that a rigorous examination of the design thinking processes will require further methodological innovation. Because individuals' perceptions of themselves and their mindset endure overtime, we need to examine behavioral and physiological as well as dispositional measures of mindsets. Behavioral measures have the potential advantage of showing how the tools of design thinking help managers overcome the ambiguity and uncertainty inherent in the design process. Future research should consider using creativity measures as a proxy for cognitive openness and experimentation. Next steps in research should explore the short term changes in mindsets and their longevity, through behavior and physiological measures.

CONTRIBUTIONS TO THEORY AND PRACTICE

These preliminary results demonstrate the "wicked" nature of the challenges involved in bringing rigorous scrutiny to the phenomena of mindset. Based on the participants' evaluation of the course and assessment of journals used for recording experiences and knowledge gained through the semester, it is clear that the students gained a revised understanding of how to view problems and problem solving.

To improve the understanding of mindsets and its connection to design thinking instruction will require investigating methodological alternatives. Self-report measures have to surmount suspicions of bias. Other measurements are available to researchers interested in these important – albeit challenging to quantify – dimensions of design thinking. Current psychology literature depends heavily on experimentally derived data. Such experiments Because design thinking helps divergent ideas emerge, measures of creativity may also provide insights to designs' impact on mindsets. Many standardized tests exist to measure cognitive and non-cognitive aspects of creative potential (Amabile et al 1996). Gestalt Completion Test (Ekstrom, French, Harman, & Dermen, 1976) uses incomplete pictures to assess creative solutions. Test of Creative Thinking (Divergent Production) (Jellen and Urban, 1996) measures levels of divergence against a standardized scale, with high levels of correlation, replication quality, and inter-relator reliability. There are many iterations of this test making it an ideal candidate for measuring divergence throughout the design thinking intervention. Specifically, it would be advantageous to track mindset variance throughout the intervention process. Changing chronic mindsets is notoriously challenging and building a better understanding of short- or medium-term variation may produce valuable findings.

In conclusion, these results, while limited, point toward one method for understanding the implications of design thinking in a business setting. Examining design thinking from the perspective of mindsets offers the opportunity to measure its impact on people's ability to perceive opportunities and recognize ways to generate new courses of action that defy analytical predictability. Generating new and effective training interventions will be greatly accelerated by understanding the design thinking mindset.

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INNOVATIONS IN DESIGN RESEARCH METHODS: RESEARCH-BASED ASSESSMENT OF CREATIVE EXPERTISE POTENTIAL.

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In the face of declining U.S. creativity scores (Bronson & Merryman, 2010), creative expertise may be a scarce commodity when needed most to compete in the global economy. "It is …knowledge, …skills, and …experience of an organization's human resources -… its expertise - that have become the new secret weapon in the competitive marketplace" (Germain & Tejeda, 2012:203). Problem solving, as a cluster of related factual knowledge, skills, experiences, attitudes, and value judgements related to one's job, has been used to determine expertise (Swanson & Holton, 2001, 2009) and as an attribute of the design process, offers opportunity to examine early development of creative expertise. This study examines processes of design students during problem solving, using findings to generate the Creativity Rating Scale (CRS), a tool assessing creative expertise potential.

Keywords: Creative expertise; creative potential, assessment

INTRODUCTION

The concept of expertise and its measurement has been examined in the research literature with recent focus on quantification (Germain & Tejeda, 2012; Torraco & Swanson, 1995) and application (Swanson & Holton, 2001, 2009) across various domains. Expertise, as the "performance fuel of the workplace" (Herling & Provo, 2000:5-6) has been linked by definition to problem solving. Bereiter and Scaramalia (1993:81) suggested experts are progressive problem solvers while "the problem solving efforts of non-expert[s]…[are] taken over by well learned routines…aimed at eliminating still more problems thus reducing the activity even further." If expertise is the performance fuel, creativity can be visualized as a fuel enhancer, taking levels of performance to unlimited heights, and a focus of interest to design management.

Creative expertise has been conceptualized in the research literature as a unique combination of creativity-oriented developmental factors including personality traits (Dudek & Hall, 1991; MacKinnon, 1962; Torrance, 1962), family environment and socialization processes (Sternberg & Lubart, 1996), education and training (Perkins, 1990) and experiences in creativity related professional domains (Basadur & Gelade, 2006; Blau, 1984; Cuff, 1991; Napier & Nilsson, 2006). Alternative views challenge creative expertise as a final evolution of skills and knowledge resulting from time engaged in the complexity of a particular domain (Edmonds & Candy, 2002) and not specifically related to creative development or education, distinguishing creative ideas from creative productivity. Napier and Nilsson (2006) suggest the creative entrepreneur is a creative expert, important to the development of organizational creativity. Reilly's (2008:59) research found "the overall pattern of creative response closely followed those of expertise" suggesting close

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reliance on expert thinking skills by creativity. Practical to identify an individual's creative expertise potential would be useful to design managers seeking higher levels of creative talent.

Research surrounding contributions to creative expertise, however, are fragmented by creativity 'attached' to a wide variety of concepts without common definition or language. Creativity also appears to fluctuate across the life span and career paths of individuals (Simonton, 1997) with findings supportive of an inverse correlation between creativity and length and duration of experience in creative domains (Leigh, 2011).

The purpose of this research is to examine factors shaping the assessment of creative expertise potential to assist design management in identifying and developing organizational strategies to impact achievement of performance objectives. By investigating creative expertise factors presented in formal and informal learning environments encompassing problem solving, the results of this study were utilized in the development of the Creativity Rating Scale (CRS), a tool to assess individual creative potential.

THE DECLINE OF CREATIVITY IN THE US

Almost 300,000 Torrance scores of children and adults in the U. S. were analysed in research conducted at William & Mary College; creativity scores had been steadily rising, like IQ scores, until 1990 at which point scores have declined consistently for children in grades K-6. Since 1990, creativity scores have consistently inched downward (Bronson & Merryman, 2010). Two reasons were suggested, TV engagement, and the lack of creativity development in schools.

> *Around the world, though, other countries are making creativity development a national priority. In 2008 British secondary-school curricula—from science to foreign language—was revamped to emphasize idea generation, and pilot programs have begun using Torrance's test to assess their progress. The European Union designated 2009 as the European Year of Creativity and Innovation, holding conferences on the neuroscience of creativity, financing teacher training, and instituting problem-based learning programs—curricula driven by real-world inquiry—for both children and adults. In China there has been widespread education reform to extinguish the drill-and-kill teaching style. Instead, Chinese schools are also adopting a problem-based learning approach (Bronson & Merryman, 2010:n.p.).*

Nickerson (1999:392) suggested nature and nurture as important determinants of creative expression aligning with the conceptualization that creativity can be taught or enhanced. The research literature reveals consensus that creativity can be enhanced through education and training (Amabile, 1983; Bronson & Merryman, 2010; Finke, Ward & Smith, 1992; Smith, 2009; Sternberg & Lubart, 1996) while others believe humans are born with creativity (Robinson, 2006), while still others have noted creativity's diminishing presence (Edwards, 1999).

CREATIVITY AND EXPERTISE

A shift from traditional approaches focused on developmental factors to studies of creativity from cultural and systemic perspectives (Csikszentmihalyi, 1996) can be identified in the literature. The introduction of technology affecting process and product (Rhodes, 1987) has enhanced idea generation processes enriching creative outcomes and expanding boundaries of creative thinking (Boden, 1999; Edmonds & Candy, 2002, 1994; Santanen, Briggs & De Vreede, 2004). When one is deemed to have 'expertise', assumptions are made regarding one's abilities and competencies. While one would not identify a recent graduate as embodying creative expertise when compared to practitioners with many years of design experience, this research suggests factors informing domain expertise can be examined by observing the actions and outcomes of the design process and in particular, the problem solving phase.

Empirical evidence can be extrapolated to assist practitioners in accessing the creative talent and skills needed for positions in the design professions requiring high calibre creativity; especially when the economy reports a scarcity of employment opportunities. Pinpointing creative processes

and thinking skills utilized while designing informs and deepens understanding of where and how individual creativity can be enhanced. This research study focused on the steps taken in design problem-solving, examining correlations with factors considered to influence design excellence as a component of creative expertise.

DIFFERENTIATION IN DEPTH OF CREATIVITY SKILLS

In Reilly's (2008:68) study of the relationship between creativity encompassing novice and expert actions, she establishes polarity in their characteristics as those involving surface activities and those involving greater in-depth activity. Her findings suggest greater complexity and depth of thought in the processes of experts. Although on the surface, it appeared the expert was doing more problem representation, upon closer inspection, the majority of comments by experts I her study were phrased in the form of open questions to team novices, who then began to exhibit a greater capacity for learning. She found expertise could be influential without being located in a single individual, but rather held collectively by a group; novices could be creative when engaging in collaborative relationships with others to make sense of their experiences. Given the differentiation between novice and expert, examination of a problem solving processes should reveal significant contributors to domain mastery, providing a starting point to assess individuals for professional development or during recruitment processes.

RATING SCALES FOR CREATIVE PROCESSES AND ABILITIES

Studies linking process methods to design outcomes can frame factors leading to greater likelihood of achieving creative expertise helping practitioners and design managers. A majority of tools, however, have been developed for educational purposes rather than professional development application. The Creative Processes Rating Scale (Kulp & Tarter, 1986) was developed for use with elementary school students to assess the creative processes of children in the visual arts. The Profile of Creative Abilities (Ryser, 2007), a 36-item rating scale measuring creative abilities, domain-relevant skills, creativity-relevant processes, and intrinsic task motivation, was also developed for use with children under 14 years.

The development and documentation of a realistic, practice-based design process model and assessment instrumentation that considers sequence and types of actions taken, antecedent knowledge, and knowledge seeking, as well as decisions made resulting in higher levels of creative output can greatly benefit emerging design and tenured practitioners alike. Further, making creative contributors more overt could determine best-fits for positions requiring high level creative thinking inviting future creative expertise.

DESIGN PROCESS MODELS

Creative process stage models have sought to enhance problem solving efforts by formalizing a protocol for activities. Much research has been devoted to creativity and design process models, yet creative problem solving remains elusive in terms of a step sequence resulting in higher levels of creative output. Empirically tested prescriptive models have led to an understanding that principles of cause and effect are at work during the process (Santanen, Briggs, & De Vreede, 2004); however, little comparative work has been conducted on the sequence of activity stages of the creative design process focusing on increasing creativity in the outcome of the design product. The development and documentation of a realistic, practice-based creative process model that considers the sequence of steps and types of design decisions being made, and the impacts on creativity in solving a design challenge would greatly benefit design students, practitioners, and their clients and serve as a framework to address creative expertise.

Previous creative process research is challenging in comparing findings due to confusion over terminology. Terms have been used interchangeably or remain poorly defined. Exacerbating this confusion, researchers and academics have referred to the creative process as the 'design process' (Aspelund, 2010; Lawson, 1997; Poldma, 2009) and as a 'problem solving process' (Harris, 2002; Koberg & Bagnall, 1991). Researchers have defined creative activities that occur as

a ‘process’ (Koberg & Bagnall, 1991; Lawson, 1997) and as a ‘model’ (Lubart, 2001). Within the conceptualization of the creative *process* several researchers have defined activities in terms of phases, steps (Harris, 2002), stages (Aspelund, 2010; Wallas, 1926), or concepts (Poldma, 2009) further muddling an ability to compare activities Additional conflicts in terminology include naming of elements comprising creativity as components (Amabilie, 1996) as well as factors (DiLiello & Houghton (2008) and even construct when referring in general to the term creativity Terms such as creativity thinking or creative thinking, and critical thinking have also been used interchangeably. In actuality, the two terms have distinctly opposing characteristics; creative thinking is explorative, innovative, and unconstrained where critical thinking is defined as focused, pragmatic, and constrained. Despite an appearance of moving toward one as a departure from another, an individual can exhibit high levels of each (Nickerson, 1999). A clear and common definition of ‘creativity’ terms is needed, inviting study of creativity, the creative process and their relationship to creative expertise.

Guilford’s (1950) seminal definition of the creative process describes the construct of creativity, used in this study, as the sequence of thought and actions producing novel, adaptive solutions. Actions within the creative process are referred to as stages encompassing multiple tasks. Traits and skills which compose creativity are referred to as components.

Amabile’s Componential Model of Creativity brings together personality, cognition, and social factors in identifying components deemed necessary for creative production in a given field. This model builds a descriptive framework of how one may come to solutions during the creative process by addressing how the components contribute to a five-stage creative process model (1996). The model used was based upon earlier research models developed by Wallas (1926) and Hogarth (1980). These stages include:

- Problem or Task Presentation
- Preparation
- Response Generation
- Response Validation, and
- Outcome (Amabile, 1996).

This model considers high and low levels of creativity. The first stage in Amabile’s model, Problem or Task Presentation, is where the problem is either discovered or presented. Task motivation (intrinsic, as well as identified external motivation) is an important influence on this stage as the creator would require high levels of motivation to accept the challenge of the problem. The second stage, Preparation, is where the creator uses or reactivates relevant knowledge to evaluate the problem. During this stage Domain Relevant skills are used. The third stage, Response Generation, is where the creator searches memory and environment to generate responses. Both motivation to continue the process and creativity-relevant skills would be utilized to explore cognitive pathways for problem seeking. A particular pathway is selected to pursue the problem. This stage is followed by Response Validation in which the creator tests the possible response against factual knowledge and established criteria. It is during this stage domain-relevant skills would be used to validate the response for correctness and appropriateness. The fifth and final stage is Outcome in which the final solution must be judged; the creator has either accomplished the task, failed at the task and stops, or returns to previous steps and continues work. Task motivation would be required if the creator has failed and needs to return to previous steps in order to achieve continued progress. Work on a complex problem may contain several of these loops if task motivation is sufficiently high until the desired result is achieved.

The process model described above contains both divergent and convergent thinking skills. Guilford’s (1950) classic distinction between convergent and divergent thinking is convergent thinking moves linearly toward a single solution, while divergent thinking moves associatively through multiple ideas. Domain relevant skills can be considered an example of divergent thinking as the creator sifts through previously recorded information in order to formulate a new idea.

Creative thinking skills contain primarily divergent thinking as well as convergent thinking skills. Examples of convergent production include problem finding, and response validation; whereas, divergent production includes data finding, and discovery of multiple solutions. (Vail Sand, 2002).

The three Components of Creativity - domain relevant skills, motivation and creative thinking skills - appear necessary to achieve high levels of creative output. Upon analysis, it becomes apparent motivation is an intangible infusion throughout the process. Motivation is not only needed to initiate the quest to solve a problem but also to continue the pursuit even if desired outcomes are not achieved. Domain experience is necessary during the initial or analysis stages of the creative process and again to a lesser degree when testing the problem. Domain knowledge is used by the creator to first find a problem and then uncover its components', and is typically utilized in more analysis driven activities. Creative thinking is the highest level of thinking, contributing to the synthesis phase of the process when ideas are being judged for level of novelness. Understanding how these three components interact in the creative process provides a foundation upon which to examine the creative process. It is within this ideology, the methodology for the study is framed.

THE CREATIVE DESIGN PROCESS

The design process is a multifaceted and dynamic path of thinking required to execute a project in project-based disciplines including interior design and architecture. Psychologists and philosophers have studied phases of the creative process; however little comparative work has been conducted on the stages regarding taxonomy of analysis or synthesis among models. Ten seminal and contemporary creative process models were considered for comparison to examine their similarities and differences regarding stages and cognitive processes. These models were selected for analysis to provide a representative and interdisciplinary view of the creative process spanning the origins of creativity to contemporary thinking about the design process. These models were grouped according to number of stages and used the transitional nexus between analysis and synthesis activities - the point of creation or idea generation - as a baseline to view the model's focus and contributions to creative thinking; the majority of stages reflected a focus emphasizing analysis. Analysis is the process of dissecting and analyzing a problem and synthesis is the process of putting those parts together to formulate a solution (Kilmer & Kilmer, 1992). Visual analysis resulted in four distinct categories: simple, balanced, complex analysis, and complex synthesis.

For this comparison the constant was the transition point between analysis and synthesis or the stage of idea generation (see Figure 1). Between these activities is the stage when the creator generates multiple solutions to later edit. Creators have written about the

appearance of the solution as the climax to the creative process. This climax is often recalled as sudden and self-certifying; the creator is convinced of the appropriateness of the idea even before it is tested (Csikszentmihalyi, 1996; Kneller, 1965). Feldman (1988:271) recounts a moment of insight as the "moment when things came together so forcefully and dramatically as to nearly knock me off my feet."

Figure 1 Comparisons of creative process models within analysis-synthesis context

Mayer (1995) described this same insight, referencing psychological studies, as completing a scheme. Where creative problem solving involves figuring out how the givens and the goal of a problem fit together within a coherent structure, insight occurs when a problem-solver fills the gaps between analysis and solution. Insight triggered by visual data, as a sudden reorganization of thinking, occurs when the problem-solver looks at a problem in a different way. Insight is the reformulation of a problem, removal of mental blocks, and finding a problem analogy where past experience can spark thought. It is the “aha” moment in the design process.

Four model typologies are presented in Figure 1:

- **simple process models**, each starting with a phase of analysis, when the parameters of the problem are initially understood, then moving to a generative stage, when the creator makes first attempts at solving the problem, and concluding with a phase of judgement; reflection is missing;
- **complex balance process models**, maintaining balance between the stages of analysis and synthesis, containing more stages than previous models with unprecedented stages listed – an acceptance of the problem followed by a formalized stage of analysis, and finally a discrete stage defining the problem before ideation takes place; these models begin to formalize a stage of reflection but only upon the merit of the solution and not evaluating the success of the process for use in other inquiries;

- **complex analysis process models**, in which emphasis is placed on idea generation, with elaborate analysis tasks at different intervals throughout the process; and
- **complex synthesis process model**, one process model investigated added stages after idea generation, is more solution oriented with more stages in synthesis, with reflection informally addressed by Aspelund (2010).

The proposed creative process model (Mattingly, 2010) utilized in this study includes both stages in the design process, and is influenced by Amabile's et al. (1996) Components of Creativity models within each stage (Figure 2).

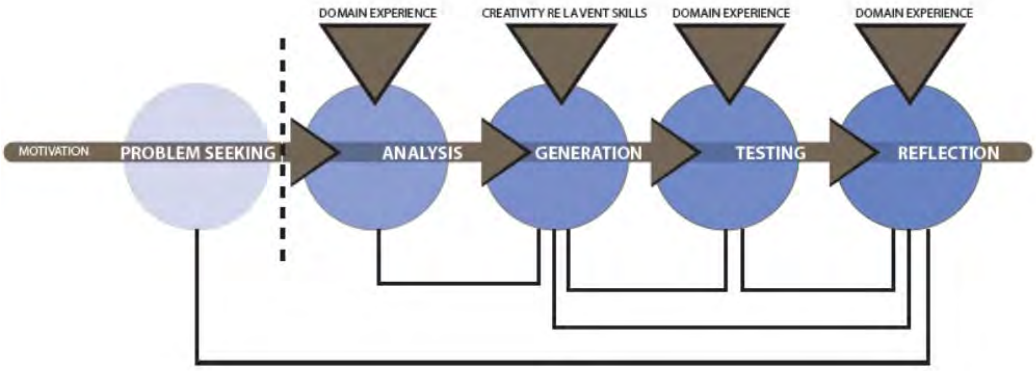

Figure 2 Proposed creative process model (Mattingly, 2010)

METHODOLOGY

Thirty-six students in a senior interior design capstone class were assigned the completion of a design problem involving sustainable seating spanning a two week time frame. Students were in their last year, attending an accredited interior design program directed at preparing the entry level interior designer. "Council of Interior Design Accreditation-accredited programs assure the public that interior design education prepares students to be responsible, well-informed, skilled professionals who make beautiful, safe, and comfortable spaces that also respect the earth and its resources" (CIDA, 2012). All were female, and 75% had participated in a required design internship preceding this project assignment. The project occurred in the final two weeks of a 16 week semester, following completion of a team service-learning project and detailed program for a large scale space to b planned in the following semester providing students role modelling for problem identification and problem solving activities and approaches.

Students received an introduction and overview of the project on the first day of the assignment from the instructor encompassing the scope, project requirements, schedule, description of the project products (scale model and process board), and a description of the reflective journaling. Assignments sheets were provided to each student and available electronically; in reading the

assignment script, the instructor added no additional information. The assignment asked the student to design a piece of lounge furniture to meet aesthetic, sustainability, and transportation and packaging objectives. Assignment deliverables included a scale model with illustrated process board.

Demographic data were also collected from student records for each participant for age, credit hours (transfer, resident), state of residency, GPA, and study abroad experiences.

JOURNALING

Students shared generative processes during problem identification and solving through reflection using an electronic journaling procedure. Four question prompts were sent to students after each of four classes. Students were to respond within a 24-hour window to encapsulate their reflections within a similar frame of time for purposes of comparison across participants. Prompts were designed and directed at the problem-solving process and phases of action relative to Amabile's Computational Model of Creativity (1996; refer to Table 1). These responses served as the primary source for data collection. Students were familiar with electronic journaling used in a previous project. Of the total cohort, thirty students signed consents to participate, with twenty completing the journal prompts within 24 hours of the journal prompt (N = 20).

EXTERNAL EVALUATION

Upon completion of the project, furniture scale models and process boards were examined by two external evaluators to rate level of novelty and appropriateness of each design solution. Solutions were scored using a Likert scale with creativity defined on two dimensions:

- Level of novelty (uniqueness or innovativeness)
- Level of appropriateness ('made good', 'feel good', 'look good' using language identified in the project competition framing the activity)

STUDY FINDINGS

Journal entries were examined using a deductive process with qualitative software (QSR NVivo v.9) to assign responses to process steps and gain understanding of the sequence of steps the students were taking in the project. Using template analysis (Crabtree &Miller, 1999), data were coded according to *a priori* themes within which keywords were identified. Nodal development according to predetermined codes allowed examination of process phasing during the project timeline. Examining journal entries after each prompt confirmed analysis and generative stages of the design process with problem seeking, testing and reflection not validated in the student reflections possibly influence by the short time duration of the project and end of semester assignment crunch of other course responsibilities.

Table 1 Question prompts for journal responses

Component of Creativity	Prompt 1	Prompt 2	Prompt 3	Prompt 4
	Week 1: Monday	**Week 1: Wednesday**	**Week 2: Monday**	**Week 2: Wednesday**
Creativity relevant skills	What will inspire your project idea? How will you acquire ideas for the project? What are your next steps?	Describe where you are currently in the project? Was there a point where you have felt frustrated or weren't making progress? If so, what steps did you take to move forward? What have you accomplished at this point? What are your next steps?	Describe where you are currently in the project? What have you done to bring you to this point? What are your next steps	Describe how you generated ideas for the project? Did you seek feedback or dialogue regarding the project? Describe the feedback you received on your idea and delivery of the project and from whom
Domain relevant skills	Will you research for this project? If so, what topics? How will you start the design of this project? Can you relate this to any previous works?	How are you judging your progress? Can you relate your design work to a previous experience you have had?	How are you judging your progress? Has research informed your design up to this point? Please describe how this influenced the design.	Have any of your previous experiences informed the design of this project? What do you wish you would have known/researched prior to the start of this project?
Motivation	How interesting is this project to you?	How do you feel about the work you have completed? How excited are you about moving this project to the next stage?	How do you feel about the work you have completed? How excited are you about moving this project to the next stage? How will this project inform your future career?	How do you feel about this project now that it is complete? If given the time would you make any further changes?

Following the analysis of the participants' journals, two external evaluators were invited to assess product outcomes for participants relative to degree of novelty and appropriateness for the project assignment. Products were rated on a 5-point Likert scale for each of the two criteria resulting in 10 possible points per evaluator and 20 possible points total for each student project score. Six individuals had scores of 15 or higher and five individuals had scores of 11 or lower. The first group was designated as the high creativity group and the latter, the low creativity group. Statistical comparison of the two groups revealed several differences (Table 2).

Participants in the 'high' group had higher GPA's, number of transfer credits and total credit hours suggesting broader sources for information and intellectual stimulation, potentially greater opportunities for problem solving exposure with greater success. Students with broad experiences (transfer credit hours) and domain experience (college-level credit hours) achieved higher levels of creative output.

In comparing the level of creative output and demographic characteristics to the process of the participants in both groups, little difference was found in the sequence of tasks; both groups illustrated use of the process steps in problem solving.

Table 2 Group comparison on creativity, age, GPA, and credits

Cohort	Age	GPA	Transfer credits	Total credits
High creative	**23.6**	**3.83**	**46**	**152**
Low creative	**23**	**3.29**	**21.2**	**127.4**

Note: Credits required to graduate = 120

Differences surfaced between the two groups within types and degree of response (Figures 3 and 4). In the Analysis Phase, students in the high creativity group sought greater diversity of information foci and sources and were more likely to seek sources beyond simply accessing the internet or available trade publications in researching the assignment. The relative degree of specificity regarding their task was higher in the high creativity group.

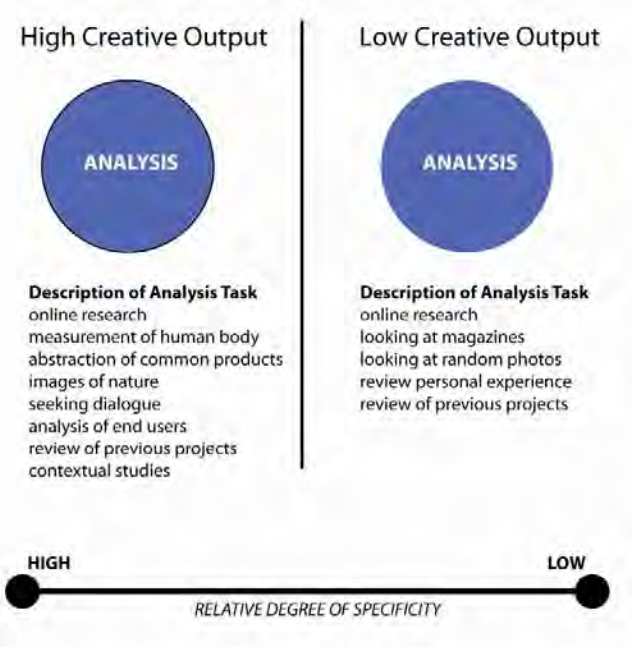

Figure 3 Comparison of analysis task between designated cohorts.

Individuals in the low creativity group exhibited greater vagueness in their responses, describing sources as ‘online research’. Those in the high creativity group were specific regarding what they were researching, why, and how the information would be utilized. Less distinction was found between groups in the Generation Phase. Both groups included students who identified ‘sudden inspiration’ as well as those experiencing multiple iterations using more quotidian or smaller progressions toward a final design solution. When asked about frustrations experienced during the process, individuals representing the high creativity group noted difficulties in editing ideas or ‘narrowing down’ inspirational ideas and conceptual references. The low creativity group identified slowness in actually developing ideas and struggles with concrete issues such as model fabrication or time constraints. Neither group mentioned significant activities involving testing of ideas, which would have encompassed validating materials use, or revisiting earlier project stages to develop a

more appropriate solution. These actions would have created feedback loops potentially improving solution quality.

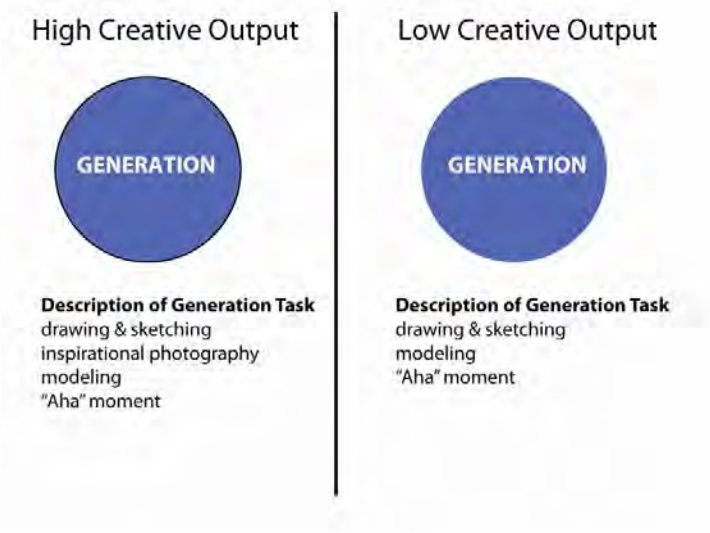

Figure 4 Comparison of generation task between designated cohorts.

The fourth journaling entry elicited responses focused on reflection, using recall of the entire process. Sample entries differed on specificities, detail an expansion of conceptualization.

Sample entry from student in high creative output cohort:

> *Initially, I searched for inspirational images on line, in books and magazines and blogs I follow. I knew I wanted to make a chair for two people and to really comment on the shapes and contours of the human body. I then became inspired by those little hand-made fortune telling games you make as a child. This was where I really started generating ideas of my chair. I made several of these fortune telling games out of paper and folded them in every possible way – playing with the angels, shapes, and forms created by changing the position of each fold and flap. I then took pictures of these conceptual models – studying them for possible positions that offered a "seat". This was all still very abstract. I researched materials and construction techniques of furniture to generate further ideas and began putting a model together in SketchUp to be able to manipulate it further. Along the way I generated ideas alongside conversations with my peers and relatives who were all helpful in inspiring and giving me honest feedback along the way.*

Sample entry from student in low creative output cohort

> *I generated ideas by researching what materials are recyclable and sustainable and what the basic need was for the assignment and end result of the chair.*

PRODUCT OUTCOME ANALYSIS

Products in the high creativity group illustrated abstract ideas informing concept and ultimately the form of chairs. High creativity participant's final products included a level of changeability either in use or shape depending on needs assessed.

The student's process boards illustrated conceptual ideas (e.g., origami and bridge trusses) and indicated how the conceptual ideas evolved to inform the final design solution. The process boards also indicated how an end-user(s) would engage the seating. Solutions illustrated multiple drawing

types and composition of the board used a variety of text styles with imagery. Scale models were well constructed and utilized saturated colors and multiple material types.

The products of students in the low creative output cohort were relatively more concrete in usage (having one purpose) and their process boards illustrated less about their inspiration or concepts and focused more on materiality or usage. Process boards reflected limited relationships between conceptual ideas and final forms of chairs. Less variation in composition and imagery was exhibited and scale models were often small, utilized one major material with little flexibility in form. No relationship between the end-user and chair was evident.

Figure 3 Example of student process boards and scale models in high creativity cohort

Figure 4 Example of student process boards and scale models in high creativity cohort

CONNECTION TO PREVIOUS PROJECTS OR EXPERIENCES

Students in the high creativity group demonstrated greater abilities to formulate abstract connections to previous projects and transferred design process skills from one project type to another. Despite having not designed furniture prior to the assignment, these individuals implemented a process similar to that used in designing space. Students in the low creativity group did not relate this particular project to any previous experiences or if so, related the project to more concrete accounts tying these experiences to discrete areas (e.g., pinpointing retail work experiences of unpacking merchandise to the chair assembly).

Students in the high creativity group utilized divergent thinking skills to a greater degree as reflected in responses to areas of research foci and inputs influencing their process. These students had three to four areas of research inquiry from the beginning of the assignment and added more specific inquiries to support the process where they thought appropriate. They were

able to connect seemingly unrelated ideas to generate a cohesive design concept (e.g., the lifestyles of persons living in metropolitan areas to the concept of the chair). A majority of students in the low creativity group noted research on concrete topics such as materiality or assembly.

Students in the low creativity group utilized research to rationalize decisions. At times, they predetermined the use of a specific material to later research that material's appropriateness for the design. The implication is rigidity in design thinking and using information to qualify decisions previously determined in lieu of using information sets to develop questions and ideation.

PROCESS DISTINCTIONS WITH IMPLICATIONS FOR CREATIVE OUTPUT

Comparative analysis of the two cohorts identified process distinctions with implications for higher levels of creative output.

ANALYSIS TASKS

Students in the high creativity group utilized multiple analysis techniques, bringing together discrete ideas to form a unified concept. Students in this group demonstrated cognitive activities including utilization of theory, careful thought about the human form, and abstraction from ordinary objects. Their counterparts typically, concluded their research activities with precedent studies. The high creative output group also referenced more instances of human factor studies and mentioned increased and earlier interest in the end-users, natural elements, or ergonomic issues. Their counterparts were generally vague about resources; used simplistic descriptors such as viewing previous competition submissions, or "looking at pictures".

DOMAIN EXPERIENCE

Students in the high creativity group reflected facile learning transfer and noted ease in reconciliation of the process of furniture design to that of previous endeavours. Students in the high creativity group appeared to be able to find intangible similarities to previous projects and experiences while students in the low creativity group recounted relatively concrete experiences such as a negative experience of moving furniture or positive experiences with other chairs and seating types. This data suggests increased levels of domain experience appear to coincide with increased creative output as noted in Reilly's (2008) study findings.

GENERATIVE TASKS

Despite utilizing similar tasks in the generation phase including: sketching, brainstorming, and modelling, a significant distinction was revealed when the students were asked about the occurrence of frustration during the project. Both cohorts mentioned frustrating encounters; however, the cause of these frustrations differed between groups. The high creativity group reported problems in eliminating a multitude of ideas or did not want to select a single idea to document. These students deflated frustration levels by a change of scenery or "stepping back" from the project, confirming high levels of creative relevant skills - being able to abandon unproductive ideas and having the work ethic to find ways to continue or find more productive strategies. The group with less creative products struggled with "road blocks" with ideas or inspirations slow in coming; they also struggled with more concrete issues such as model fabrication or material selection.

MOTIVATION

Both the high creativity group and the low creativity group exemplified generally high levels of motivation. Students felt the project was novel and allowed them to explore unique parameters and opportunities. Students indicated excitement to add their chair projects to their design portfolios or wanted to further explore the discipline of furniture design for future career opportunities. No explicit distinction in motivation levels was revealed between high creativity and low creativity groups.

TESTING

Due to time constraints neither high nor low creativity group readily participated in a formal phase of testing an idea. Testing occurred only at relatively trivial levels and was initiated to explore specific, explicit criteria and not to test the overall solution itself. This may be due to fears of highlighting issues which could result in poor grading assessments or perceptions regarding limitations of the project timeframe.

REFLECTIONS

An unanticipated measure of creative output was the elaboration in responses themselves. The high creativity group averaged 414 words per entry and the low creativity group averaged 388 words. This may be attributed to breadth and depth in exploration of the high creativity group or to the vagueness of response found in the low creativity group. It is unclear if there is a relationship between higher levels of writings skills to higher levels of creativity.

CREATIVITY RATING SCALE (CRS)

Differences in the performance and products of high versus low creativity in individuals can serve as a basis for the development of a tool to assessing creative expertise for professional development and recruitment of talent. The Creativity Rating Scale (Mattingly & Leigh, 2011) was developed to question individuals on creative lifestyle choices using 6 questions encompassing: domain knowledge (i.e., advancing knowledge through internet research, magazine subscriptions, books, and openness to new life experiences); level of task engagement (i.e., likelihood of achieving a sense of *flow* during a design task and an ability to connect current tasks to preceding ones); level of divergent thinking (i.e., likelihood of generating multiple solutions to a given tasks); as well as current task and overall intrinsic motivation. By summing the scores in each area, strengths as well as weaknesses can be identified along the dimensions of Amabile's (1996) model.

The instrument, used as a self-assessment, can invite potential for false or exaggerated responses; however, beneficial in developing an understanding and generating dialogue between design management and design staff surrounding expectations and contributing factors in approaching a project. In addition, strengths as well as weaknesses can be identified along the three areas of Amabile's (1996) model of individual creativity. Application potential is threefold; for business management, staff mentoring, and self-administered to enhance strategic career plans. Used during the hiring process, the CRS can assist managers in considering a candidate's potential within an organization and help the candidate to self-select their overall fit within the organization. The assessment could be used to identify productive team pairings for upcoming project staffing. In mentoring and performance reviews, the CRS provides a framework to enhance skills and determine objectives for performance assessments. If administered on an individual level, the CRS can be used to self-identify areas for potential growth and goal setting.

FUTURE TESTING AND EVALUATION

The Creativity Rating Scale is available for testing and modification within design practice-based settings. It is hoped that scores from the CRS can be compared to retention rates of new hires as well as serve as a source of data for future longitudinal studies tracking career progress within the design industry.

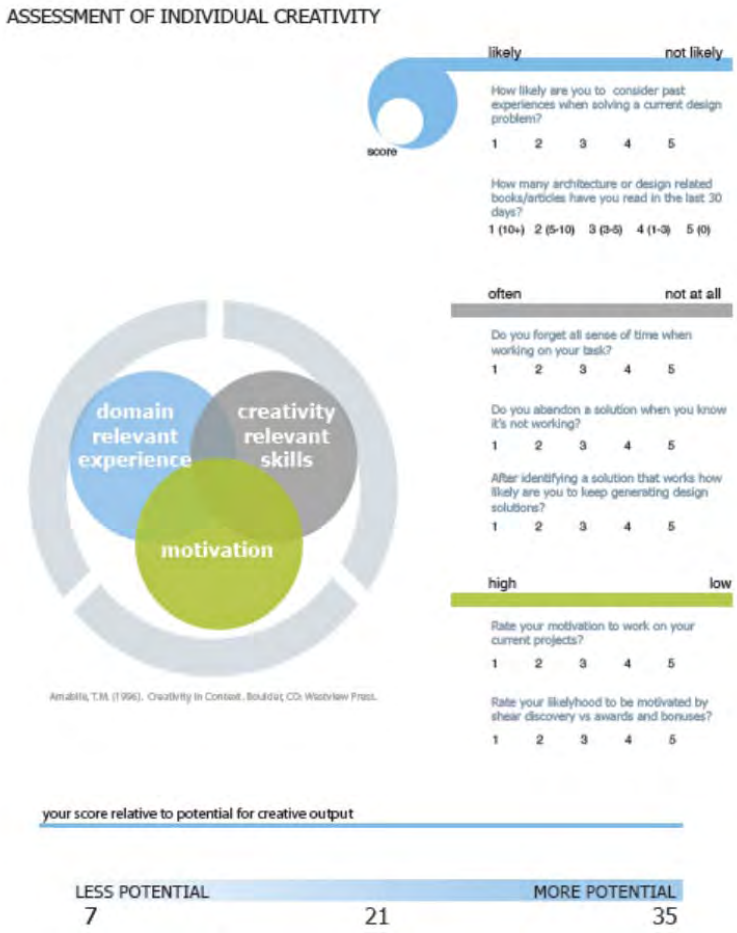

Figure 5 Creativity Rating Scale (CRS)

DISCUSSION

Creative expertise is an important factor to be considered in design management in the highly competitive business environment facing the design professions. This study, conducted to assess individual creativity, suggests areas of focus for future examination regarding the development of creative expertise, affecting the practice of design and other creative disciplines. Building upon empirical research, the findings create a foundation and manageable framework for a firm's leadership to leverage increase creative expertise in the development of staff members and an individual's productivity in key areas. By making staffing selection transparent based on explicit factors surrounding creative expertise, current and future staff members may feel they are more likely to have an opportunity to fulfil their potential and obtain meaningful expertise , and more likely to be motivated to remain within or join an organization. Using tools derived from this research, a firm can obtain and retain visionary, creative staffers and future industry leaders. In a competitive market with an emphasis on design thinking and project approach, having key creative staff can help distinguish a firm from its competition and navigate an ever-changing global environment.

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DESIGN IN ACTION - BUILDING A MODEL FOR KNOWLEDGE EXCHANGE BETWEEN INDUSTRY AND ACADEMIA, USING DESIGN AS A STRATEGY FOR BUSINESS GROWTH IN SCOTLAND

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As UK government and public policy bodies seek routes back to economic growth, the domestic higher education sector has been identified as a source for innovation. The Scottish economy's particular weaknesses in industrial R&D mean that resultant knowledge exchange is critical. *Design in Action* proposes a model to meet these complex demands.

Keywords: Knowledge-exchange; design; innovation

BACKGROUND

The western economies seeking a return to growth do so in the face of global competitors who have transitioned from nascent threats to domineering powers. Scotland is a small northern aspirational nation that has sought to grow multinational successes from a limited existing corporate base, with equally limited success. New models are required for growth, which meet the needs of the Scottish economy, exploiting natural strengths and exploring new opportunities.

This paper will present a theoretical and operational model, for a Knowledge Exchange Hub called Design in Action (DiA). DiA is a model that seeks to exploit existing factor endowments in the Scottish economy through the application of a radical innovation methodology to develop new products, processes, services, systems and experiences. DiA will develop design led teams through a managed development process that can apply a sophisticated range of design tools.

By necessity the underpinning research of the development of DiA has been positioned from national strategies, Scottish Government papers, UK government papers, The Design Council, The Design Museum, V&A at Dundee project, 34 partner design businesses in Scotland, the wider design community, and other closely associated bodies. This has ensured that the positioning is appropriate, meets an identified need, does not replicate or duplicate existing structures while adding real value to Scotland and its potential for growth of the design economy. The partner organization are the four Scottish Colleges of Art, Grays School of Art-Robert Gordon University, Duncan of Jordanstone College of Art and Design–University of Dundee, Edinburgh College of Art-University of Edinburgh, The Glasgow School of Art, together with the University of Abertay Dundee and Institute for Capitalising on Creativity – St Andrews University

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CONTEXT

Design's origins can be traced to the Great Exhibition of 1851. A major contributor was Henry Cole (b 1802- d 1882) who became the first director of the V&A, established to showcase excellence in design and manufacturing. The Great Exhibition and the establishment of the V&A bought design into the public consciousness as a driver of industry, providing economic value through visually literate products. The visual connotations were achieved by ensuring that form followed function; articulated through visual signals identifying the way to use a product, thus achieving a marriage where the visual language of products signalled to the consumer, function. Form ensured a linkage between products functionality and the ergonomics associated with safety and ease of use (Design Museum 2009; REF).

It could be argued that the true gallery for design is the high street, where products are grounded in the harsh realities of economic value, need and functionality. The sophistication of the shop window as a visual retailing tool has long been viewed as the mechanism by which the consumer is enticed into purchasing. Consumers use the shop window as a gallery to understand contemporary trends. The shopping centre has become an event associated with social value; a gathering space with buying being an aspect of a larger social process, of enjoyment, trying and testing alternatives, eating and window-shopping. The museum and the shopping centre now serve similar roles, a social and retail space. The consumer understands the value of their purchases in terms of cost, not just financial but also time, convenience, quality and choice, online shopping is becoming a preferred choice for many.

DESIGN

Design is a discipline that constantly evolves; its remit and service to the consumer still holds primacy, design listens and takes account of changing consumer demands and needs, recognition of change is the principle driving force for design as it is always market driven; understanding these aspects enables design to constantly deliver products fit for purpose. The Internet has opened up new markets for products, processes, systems, experiences and procedures that are now core to the discipline of design and are having the most far reaching effect on design repositioning itself, so as to continue to embrace its core values of society, need, function and cost.

This digital revolution (or the third industrial revolution 1980) equal to that of the earlier industrial revolution (1750-1850) and the technology revolution 1860-1920 culminating in mass production and the production line, have changed the face of consumerism, raised expectation and created a more savvy and demanding consumer. This has left the previously accepted methods of engagement with the consumer as recipient in disarray. The consumer now expects from the design industry a fully articulated product from conception through development to tailored social marketing (Fitch 2012; REF). It is only when these conditions are met that the consumer responds positively and purchases. Consumers want to be treated individually, they expect both a professional and personal service, they want to be engaged with at another level, which technology facilitates, in other words they want a full 360 degree product, one that defines their individuality and enables them to feel valued.

These demands are a reflection of the raised levels of knowledge generated both by shopping centres, the media and the museum/gallery. The Internet has made the consumer king/queen and shifted the balance of power back to the individual. They want it all, a product, a process and a service. (Breward and Wood 2012; REF)

SCOTLAND AND DESIGN AS INNOVATION

Design within Scotland currently holds an uncomfortable position in that it rests between agencies, none of which are fully charged with a developmental agenda. There is no Design Council in Scotland its work was merged with Scottish Enterprise; Creative Scotland holds the cultural portion of design. This means that the resources are divided between two different organisations, with two separate agendas, and business and industry are confused about where to access design knowledge, research and information. DiA has been positioned to fill the gaps in the national

infrastructure, working in partnership with all existing agencies to operate effectively as a project that builds design knowledge through research, experience and practice. DiA will listen to the professional community, build knowledge and awareness of design as a discipline, generate business opportunities through innovation events, seek to establish professional networks, and above all give visibility to design and designers.

Design had been a neglected part of Scotland's cultural portfolio, it has no real place in any of its national collections, or visibility within its cultural infra-structure. Over the last five years the University of Dundee has built an effective partnership to bring to the city a branch of the V&A to establish a central focus for design and design practices in Scotland. This successful engagement has resulted in the realisation of the V&A coming to Dundee and forming a new cultural institution, closing the design gap in Scotland, the V&A at Dundee is positioned to open in 2015.

The V&A at Dundee is also charged with delivering on the innovation agenda for the creative and cultural industries, and "Design in Action" was conceived to facilitate this agenda. DiA is now one of four Knowledge Exchange Hubs funded by the Arts and Humanities Research Council. DIA has been developed to ensure that industry has access to university research and universities can develop working partnerships with industry for the long-term interchange of knowledge between the two sectors. (V&A at Dundee 2012; REF)

An evaluation of existing Scottish mechanisms for innovation using design, usually places engagement with design at the end of the innovation process, as a facilitator of an existing decisions, post manufacture, viewed as a separate identifiable process of preparing the product for market, via branding and marketing (Scottish Enterprise 2011). There is a growing recognition that this is not a purposeful use of design and recent additions have included the supported writing of a project brief using design as a facilitator of the innovation process (Scottish Enterprise 2012). Design's full potential as a non-sectorial discipline that operates across discipline boundaries as a system of thinking, can bring systems of innovation, into every aspect of a business practice. Design has evolved from being solely identified with object generation to the processes of system evaluation and development to deliver innovation and change, manufacturing process, market requirements, consumer demographics, market positioning, cost and value. This evolution of design enables it to operate fully as a discipline that approaches and delivers with integrity the right product to right market in a timely manner. (Design Council 2012; REF)

The implications for designers to engage with these new remits which places value on the entire set of design competencies comprising their tacit knowledge; providing the client with an operational framework within which design principles function as the catalyst of principled change. Research has indicated that when design is applied in this way change stands the best chance of success, both as aspirational and achievable.

- Develop and understand the operating context of the company
- The company's ambitions for its future eg: scale, magnitude of change
- Engaging with conceptual scenarios at the primary stage of idea generation
- Close to market knowledge through engagement with users
- Scoping territory to examine existing solutions
- Evaluating failure and success
- Knowledge of the process of innovation
- Evolving potential models of operation
- Prototyping product solutions for service/product/process/system design
- Listening to and modelling a concise brief for development
- Articulating the development process
- Holding an array of tacit knowledge to employ in a variety of situations

These skills are often gifted as part of an object centred relationship and have not been viewed as a key professional service of value to the client. Approaching design in this way allowing it to be developed in an empathetic manner that fits with the overall philosophy of growth, change and development, allowing the company to successfully position itself within the wider economic framework of its competitors' and the market place. (Harvard Business Review, June 2008; REF)

DiA has been developed to fit within the current existing industry support mechanisms within the Scottish agencies frameworks. DiA's mission is to reposition design into the boardroom within organisational structures, complement existing provision and add value through strategically moving design into the management of the company. Positioning design, as the key tool for analysing, evaluating and visioning future company developments for change will ensure that is thought through across the spectrum of company activity as a whole including its products, processes, services and systems.

INDUSTRY LANDSCAPE

Scotland's company base is largely SME focussed with the number of small and medium enterprises at 305,540 as at March 2011 this is a 3.3% increase since March 2010, SMEs accounted for 99.3% of all enterprises and 53.6% of employment with a 36.5% of turnover. The size of the SME sector is predominantly in the 0-49 employees with 301,915 companies in this range (Scottish Government 2012).

This company base could provide DiA with a unique opportunity, in that SME are relatively flexible in their approach, often have not invested heavily in equipment, have IP based businesses and are willing to view opportunities for growth and change positively. DiA believes that working with this community will allow for new and different business models of cooperation to evolve, based on the experience of Dundee's computer games cluster. This has shown that there is a business model where companies expand to a level and then tend to implode, but then reemerge as multiple new businesses. This was exemplified by the loss of "Real Time Worlds" who employed over 250 individuals. When the company went into liquidation fears were raised over the industry and its ability to sustain itself. However since this happened in September 2010, the number of new games companies and their employee numbers now exceed the previous total of 250. This indicates that there is the opportunity to bring companies together to build a portfolio company to deliver to the market. These portfolio companies may only be sustained for a single product, but the hope is that they will evolve into company networks that will form and disperse flexibility meeting market opportunities. The research conducted by DiA over the next four years will verify whether this theory is correct or how it differs in reality as the economy rebuilds itself.

ECONOMIC IMPERATIVES

The rise of the Asian economies in complex manufacturing necessitated a re-ordering of UK economic policy in the late 1990s. The creation of a knowledge economy of well-qualified graduates was thought to be a means of stimulating growth in the high-value service sector. With India and China now producing graduates at an ever-increasing rate and communication technology making services ever more transferable, combined with the recognition that the UK economy has become dangerously over-reliant on the financial services sector, a further re-orientation is now vital. The UK and Scotland in particular will have to focus at the top end of the value chain where creative and innovative processes have the highest level of added value to the economy. At this level factor endowments become less physical and more political-cultural with creative dissonance and academic freedom functioning as key drivers of success. A market with freedoms is more important than a free market.

The Scottish higher education (HE) sector is both a traditional and modern area of strength for the Scottish economy. By the end of the 16th century Scotland boasted five universities in comparison to neighbouring England's two. No further UK HE institutions would be established until well into the 19th century thus maintaining and developing a differentiated culture of value and access to HE. In 2012 there are now 20 HE institutions in Scotland with direct employment of 113,160. The sector is a significant economic player in its own right and, with five universities in the global top 200 in 2011, Scotland continues to punch well above its weight in the proportionate size and strength of the sector as defined in terms of both population and GDP.

HE POLICY CONTEXT

Scotland's HE sector is publically funded with the overwhelming majority of resource coming from taxpayers via the Scottish Government. The decision to abolish student contribution tuition fees in 1999 and to reject the concept again in 2010 has set Scotland at odds with the rest of the UK. While different social policy priorities have become the norm since the introduction of devolution in 1999, the consequences of these decisions for the Scottish HE sector are significant beyond the immediate appeal of free at the point of use education and the rhetorical appeal of universal availability. The UK government's decision to introduce top-up fees in 2010 and to use that income to fill the hole left by an equal level of cut to the block grant from the HE sector led to a significant reduction in Barnett-formula consequentials in the grant paid to the Scottish Government. So the growing cost of the HE system must now be met in its entirety from a reducing overall spending envelope at a time of growing competition for the best students and staff in a UK wide free-market. It is unclear how the level of funding in the 2012 Scottish budget awarded to HE institutions to allow them to compete can be effectively sustained and justified as other areas of public spending decline.

So what policy imperatives does this place on the sector? HE institutions must increasingly be shown to deliver value and to drive sustainable economic growth. The nationalist administration lists the HE sector as one of Scotland's seven key economic strengths (Scottish Government, 15/04/2012) and there is a clear distinction between the economic role of the university as an educator and supplier of ready skills for a modern economy and as a driver of innovation. Colleges also fill the former role and it is their budgets that have been plundered to fill the tuition fee funding gap. There is also clear movement towards greater accountability, or curtailed freedom, for universities under the current administration. Legislation is proposed that will allow Ministers, for the first time, to compel HE institutions to follow policy prescriptions. In the less direct terms of funding allocation this has long been the case and the development of significant funding streams for innovation centres by the Scottish Funding Council can be seen is indicative of the direction of travel. The Arts and Humanities Research Council has also been under pressure to show an economic return for their investment and their funding for Knowledge Exchange Hubs for the creative economy forms a part of that agenda. In short the Scottish system is increasingly compelled to follow the political agenda. And that agenda is focused on growth.

GROWING OUT OF RECESSION

The Scottish economy returned to recession in the first quarter of 2012 (National Statistics, 2012) as the western economies continued to struggle with the longest economic downturn in post-war history. Government at all levels are dealing with the fall-out of the global financial crisis, from macro causes to micro consequences. So as much as there is necessity to prove economic returns from HE investment there is a broader demand for strategies and tactics that can find a path to growth.

The identified path to growth in Design in Action is through stimulating innovation. Beyond a Malthusian exploitation of natural resources the only recognised path to a form of sustainable growth is innovative ideas and associated technological change. Between 2000 and 2009 63% of economic growth came from innovation whilst only 37% came from increased inputs to the economy (Nesta, 2012). We may well have expected a significant downturn in investment during what is now the longest economic downturn in over 100 years. That collapse has lost £24bn of investment to the UK economy. But the story across the UK is even more worrying. The first decade of the 21st century saw a crisis of confidence in the innovative capacity of the UK with firms holding cash and concrete assets rather than returning boom time profit to research and development (Nesta, 2012). We have suffered a lost decade of innovation at the time that we need now need it most.

Design in Action subscribes to a model of post neo-classical endogenous growth in common with the development of the 'knowledge economy' rhetoric in the UK of the late 1990s. Where the approach importantly diverges is in the need for a more active industrial policy that identifies and actively works to obtain Scotland's place at the high end of manufacturing value chains. While we

recognise the positive effects of spillovers from investment in education as a public good we do not believe that a facilitated free market in a low cost service based economy can make sufficient return on current investment in the HE sector. Our approach is to actively stimulate innovation through knowledge exchange while challenging ourselves to produce social goods in measurable outcomes (*Table A*). Design in Action will work over a four-year period to deliver against a challenging set of metrics. If successful this methodology stands to be significantly more cost effective than current government employment creation interventions. While we do not believe that the methodology is a scaleable solution to meet the great economic challenges Scotland faces we do believe that a more design-orientated society can deliver significant economic and social progress.

Table A

Outputs	**2012**	**2013**	**2014**	**2015**	**Total**
No. of events held	8	8	8	8	32
No. of SMEs attending events	70	80	90	100	340
No. of SMEs assisted with high level support	20	30	40	30	120
No. of SMEs undertaking design innovation	12	18	20	21	71
Results					
Increased investment in RTD by SMEs	£300k	£500k	£600k	£700k	£2.1m
Products, processes or services developed	20	25	30	35	110
No. of new companies formed	1	2	3	4	10
Impacts					
Increase in turnover in assisted businesses	£100k	£200k	£300k	£400k	£1m
Total no. of gross new jobs	20	30	40	50	140
Total no. of gross jobs safeguarded	5	10	15	20	50

We recognise that the current economic situation limits the possibility of positive externalities in benign or actively positive economic conditions. At the time of writing the active partners in the Eurozone crisis are in perpetual search for a salve for the consequences of policy failure rather than a new political economy to redress the causes of the crisis. The failure of an ideological austerity drive by July 2012 is clear but the proponents remain in power and committed to their approach. The disconnect between the challenge and the lack of leadership to meet it means that very little can be said about future fluctuations in the savings rate as consumers balance their need for security against a lack of trust in financial institutions. Furthermore, and of even greater concern, is the possibility of an imminent return to a less open global economy as investors and governments protect their economies and populations and smother them in so doing. So the externalities that can give rise to growth through fruitful innovation are uncertain at best. No market seems likely to thrive with price signalling as weak as this and such instability in medium and long-term policy.

KNOWLEDGE EXCHANGE THE STARTING PLACE

DiA is seeking to ensure the dialogue with stakeholders is integrated into design research in a seamless way, from conception to completion. An objective is to communicate the transformative

potential of design and change the understanding of design as a force for sustained economic and cultural growth. To this end design will be used in unfamiliar contexts, those of Well-being, Food, Sport, ICT and Rural Economies.

The sandpit is a model of extreme innovation, (developed by EPSRC as a method for constructing interdisciplinary research teams across fields of knowledge; EPSRC; REF) used to develop trans-disciplinary research in academia but not yet explored in an industrial context. An review of methods of innovation evaluated the sandpit method concluding that it was one of the most successful model for innovation (Tidd 2006 REF). The EPSRC model will be adapted as the method used by DiA to fuse the component parts of our strategy of innovation through design, using knowledge exchange. The sandpit will be held over a three-day period, (normally 5 days) the time reduction recognizes that the business community is constrained in investing significant resource in speculative activity. To partially remove this valid concern, DiA will have formulated in partnership (the selected sectors) a scenario for which a business solution is sought. This imbeds within the process industry pull validating company engagement in the process.

The sandpit event will be instigated as an open call to academics, industry, public bodies and organisations asking for interested individuals to put themselves forward as candidates for a sandpit. DiA will in partnership with the sponsoring sector select up to 5 teams of 5/6 individuals from diverse but relevant backgrounds to participate, the only fixed element is that each team will have at its heart a designer. The groups will be bought together and through a series of familiarization exercises be grouped into teams; the process will aim to cultivate an ethos openness in exchanging knowledge to create a spirit for exploration of issues from first principals.

The sandpit plays a crucial role in the process as it is the free thinking space, ideas can be built and discussed, in this space IP is created but not attributed. Post the sandpit IP will become an issue for the development towards commercialization, as individuals engaged in actualizing the form of the product will want to understand the volume and scale of the return that they can build into their business models, and to ensure the investment is validated on a commercial level. The issue of collaborative IP will be an ongoing issue for research to establish models that operate effectively and accrue trust and are economically viable to all participants.

DiA researchers will follow the selected and supported (seed corn funding awarded to support the development process) portfolio groups that emerge from the sandpit process to understand the models that evolve for collaboration between business-business, business-academia, academia-business. Given that KE is a two way process it will also be necessary to understand the impact of KE on the academic environment and the cascade effect on the curriculum.

The separate imperative of establishing DiA as an ongoing resource, post research-funding is a further area of investigation, various models are under scrutiny including “pay to play”, equity from successful spin out projects, charging for the service, percentage related IP. The report commissioned by Lord Mandelson when Secretary of State, on the role of innovation and technology centres internationally, Hermann Hauser evaluated both their performance within the economy and the legacy model that insured their longevity. Internationally the model that seems to be operating effectively is where there are three equal parts to the funding derived from ongoing infrastructural support from central government, one third from industry and one third from IP agreements.

The report states: *“If the UK is serious about creating a ‘knowledge economy’, we must continue to invest in, and support; ensure we support the areas of the UK industry which have the ability and the absorptive capacity to capture a significant share of high value activity: and close the gap between universities and industry through a ‘translational infrastructure’ to provide a business-focused capacity and capability that bridges research and technology innovation commercialization.”* Exemplars include Fraunhoffer Gesellschaft Germany, ITRI Taiwan, ETRI South Korea, TNO Netherlands.

As the research grows and Is conducted and DiA becomes fully operational, many aspects of the programme will be developed beyond the sandpits. There will be a programme of public engagement, business tools and services, case studies, models of engagement, as well as measuring performance against the KPI's established at the start.

THE ECONOMICS OF KNOWLEDGE EXCHANGE

Driving innovation is at the heart of economic policy making but it is also one of the most difficult economic processes to predict. Technological change is lumpy rather than linear with bursts of progress and investment in research will produce results that are not just far from market but often have no obvious or even intuitive marketable application. There are stark differences between business research and development (BERD) and research and within the HE sector (HERD). BERD in Scotland is particularly low in international comparisons while HERD is particularly high. (Scottish Government, 2011). Brian Ashcroft of the Strathclyde Business School makes the following assessment:

'If Scotland is to rebalance its economy more towards manufacturing and trade, it is hard to see the low level of business R&D as anything but a weaknesses; as is the apparent failure of Scottish business to capitalise more on university research.' (Ashcroft, 12/5/12)

As a consequence the need to seek effective knowledge transfer strategies between HE and business is particularly acute. This requires an effective cultural bridge and a method of translating speculative and theoretical research into practical reality. This will require a significant cultural shift for business and HE in Scotland. We could go further and say that the cultural shift must be national if we are to draw on the benefit of design both as an analytical frame and a value based approach of co-creation and collaboration. Scotland must move beyond design an aesthetic and make it integral to productive processes.

CONCLUSION

DiA will operate an "open source" model of innovation based at the University of Dundee and as regional centres across Scotland in Aberdeen, Dundee, St Andrews, Glasgow and Edinburgh. DiA comprises a unique set of expertise and experience in working across academia, design, the games sector and businesses within the creative economy. DiA launched in June 2012 and will be delivering a programme of knowledge exchange and associated research over a 4year period (June 2012-May 2016). DiA will promote a new model for doing business in Scotland, by networking the dynamic business community to the Art college culture and academics using their flexibility and dexterity advantageously to form new portfolio companies for commercial gain through the introduction of design, as a strategy for competitive advantage within the boardroom, delivering design as an dexterous approach to visioning and implementing sustained innovation within complex and demanding economic times.

The research will be conducted alongside the knowledge exchange, over a four-year period. This research is as yet to begin, as it will follow the approach adopted by the project to the innovation agenda. The research will examine models of engagement between participating groups, to understand whether there are different approaches adopted by different sectors which the project is targeting, wellbeing, sport, food, rural economies and ICT. Each sector will be monitored by a doctoral student, and will develop case studies which will be analyised by a team of Post Doctoral Research Fellows who will draw together generic principles.

The co-investigator team will work with the chosen sectors to build an understanding of the most pressing issues that are affecting their productivity in the near and longer term. They will use this information to define and scope topics for the sandpits. It will enable research to understand whether issues that are emerging from these different sectors have similar patterns of concern and need and this knowledge will help formulate policies and strategies for the future.

Within the project team is there is a group positioned to evaluate and develop business models both for the companies and for the longevity of the project beyond its initial funding envelope. Research conducted through the direct participation with live projects will ensure that all the research is current and up to the minute.

The theory is established the team will shortly be in place, and the hub will open for business. This project will be a real test of how research placed in the service of industry performs as a tool for economic growth and sustained business development.

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DESIGN THINKING VS. LEAN STARTUP: A COMPARISON OF TWO USER-DRIVEN INNOVATION STRATEGIES

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This article analyzes two different strategies that both aim at creating innovative design or business concepts based on a user-centered approach: design thinking and lean startup. Both approaches involve customers, potential users, or other stakeholders into their development process. Although there are significant differences in both strategies, there are also several similarities in methodology and process design. This article compares process models for lean startup and design thinking and highlights the specific differences and similarities, based on a structured literature review. As a result specific modifications of both strategies are suggested. This article contributes to a better understanding of both—design thinking and lean startup, and it may help to improve either of the two strategies to foster innovative concepts.

Keywords: Design Thinking, Lean Startup, User-Driven Innovation

INTRODUCTION

Lean principles were developed in the early seventies by Toyota in Japan, called lean manufacturing, to optimize production processes (Womack, 2003). The idea of lean principles is to make the production process more efficient by reducing any sort of waste in the process—this could mean either the reduction of resources (human or material) or the elimination of needless or redundant activities or expenses, like the reduction of storage space. This strategy revolutionized production processes in the automotive industry. By now, lean principles have become also important for general management, and other disciplines like IT development. One example is “lean startup” (Ries, 2011)—an innovation method for startup companies that claims that the most efficient innovation is the one for which there is an actual demand by the users. Or put in other words: the biggest waste is creating a product or service that nobody needs. This concept is highly relevant for any strategy or method that aims at creating innovations.

The term “lean startup” was developed in the IT industry for software startups, but is more and more commonly used also for other sorts of innovation projects in other disciplines (Ries, 2011). A startup is defined as “a human institution designed to create new products and services under conditions of extreme uncertainty” (Ries, 2011, p. 8). Therefore not all new companies are classified as a startup and on the other hand also an established department in a big company could be a startup. Lean startup evolved from the “customer development” method (Blank, 2006). The idea behind these methods is, that in addition to a process for “product development”, a startup also needs a process for “customer development” to find and understand the customers.

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This leads to developing solutions based on a user-centered approach and adapting to customer needs. Within this article, we mainly use the term “lean startup” instead of “customer development”, to highlight the lean aspects of the method. The aim of lean startup is to build a continuous feedback loop with customers during product development cycles (Maurya, 2012). It tries to test the core business assumptions early in the product development process, sometimes even before any product is built at all.

Another user-driven innovation strategy that has become more and more popular during the last decades is “design thinking”. Based on designerly methods and principles, this strategy was developed by the design consultancy IDEO in the late 90s (Kelley & Littman, 2001). Although it is not referring to lean principles, the main idea behind it is similar: it tries to identify user needs in order to create appropriate solutions.

Similar to lean startup, design thinking is also focusing on users or customers. Based on a user-centered approach with multi-disciplinary teams, it aims at solving complex (wicked) problems (Buchanan, 1992; Rittel, 1972) and at generating innovative solutions. Design thinking makes use of extensive user research, feedback loops and iteration cycles. It is becoming more and more popular among business schools (e.g. the Rotman School of Management (Martin, 2009)), and it is applied in R&D departments of companies to foster innovation.

This paper provides a structured analysis and comparison of the two innovation strategies—lean startup and design thinking—with the goal to identify potentials to enrich either of the two by merging or adapting specific parts or aspects.

The article is structured as follows: The first section presents an extensive literature review that also provides short introductions of both, lean startup and design thinking, and which is then used as a basis for a comparison of the two strategies. The different characteristics are summarized in a structured framework, highlighting similarities, gaps, and differences in naming conventions of both strategies. In conclusion we suggest some modifications and intersections of the two processes, in order to reveal potential to enrich either of the two.

COMPARATIVE LITERATURE REVIEW

For re-engineering the two strategies, we analyze two types of data sources about lean startup and design thinking: 1) published literature and case studies, and 2) process models for the two different processes. We are aware that design thinking as well as lean startup are not just processes but consist also of tacit elements, like practices, experiences, specific mind-sets, and company cultures (Thoring & Müller, 2011a). These intangible elements are important and not everything in both methods can be made explicit and reduced to a process description. However, we think that a detailed comparison of the process steps is still useful to better understand both innovation approaches.

The insights from these two data sources, such as similarities and differences, are then summarized in a structured framework, which can be found in Table 1.

PUBLISHED LITERATURE AND CASE STUDIES

First, we analyze relevant literature and published case studies for both strategies (e.g. Blank (2006), Blank & Dorf (2012), Brown (2008), Brown (2009), Cooper & Vlaskovits (2010), Kelley & Littman (2001), Kelley & Littman (2005), Kolko (2011), Martin (2009), Maurya (2012), Plattner, Meinel & Leifer (2011), Plattner, Meinel & Weinberg (2009), Ries (2011), Sims (2011), and Thoring & Müller (2011a, 2011b, 2011c)). The literature review reveals that the two communities of lean startup and design thinking do not interact and cite each other very often. They use similar methods and tools, but have developed different names for them. This reveals potential for learning from each other strategy.

ABSTRACT PROCESS MODELS

As the second step, we compare the two strategies based on process models. However, for both methods there is not one defined process model available. Moreover, the descriptions of the processes are often informal and there exist various versions of the process because of adjustments and further developments. Therefore we use different types of process models: We compare two abstract models—a design thinking process model by Plattner et al. (2009) and the "lean learning cycle" (Ries, 2011), see Figure 1. These abstracted models allow for the comparison of the two strategies on a meta level: the number of process steps, order, alignment, labeling, frequency, and direction of the different activities can be checked against each other.

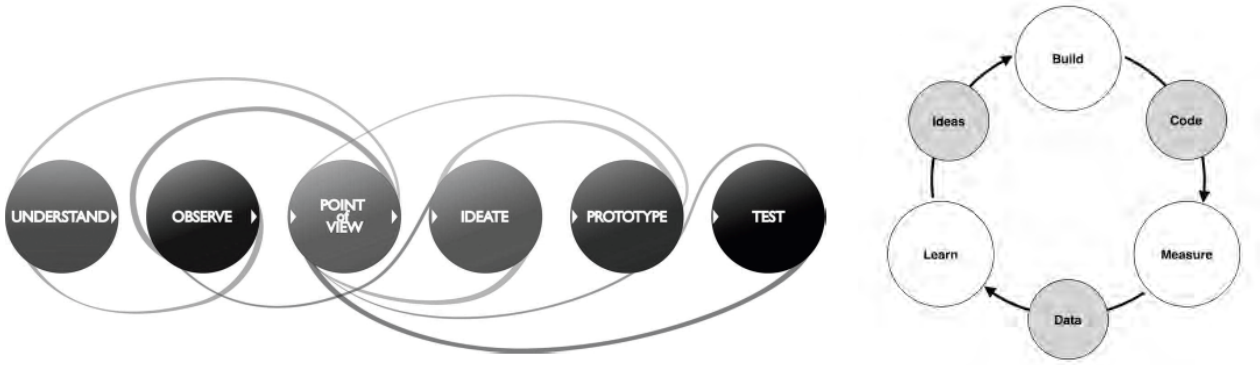

Figure 1: Comparison of abstracted process models for design thinking (left) and lean startup (right). (Plattner et al., 2009; Ries, 2011),

Both process models make use of six process steps. The most significant difference is that the lean learning cycle is arranged in a circular form, while the design thinking process is arranged in a linear way. This might suggest that design thinking should be executed in subsequent steps, while lean startup appears to be more flexible. Unlike the design thinking process, which begins with the "Understand" phase, the lean learning cycle has no clear beginning or ending—the circular alignment of the steps suggests that they are supposed to be executed in a continuous and repeatedly manner.

The goal of the build-measure-learn cycle is learning (Ries, 2011). What is built is based on a problem or solution hypothesis. The test of a hypothesis is the therefore the intended learning step. For testing the hypothesis, appropriate metrics must be defined (measure step). For generating these metrics and then test the hypothesis, an experiment has to be designed (build step). Therefore the build-measure-learn cycle could also be regarded as a classical scientific hypothesis-metric-experiment cycle that starts with the learning goal (theory or hypothesis) and ends with an experiment (prototype) to test the hypothesis.

When comparing the individual steps of both processes, some interesting similarities become obvious: e.g. "learn" in lean startup could be interpreted as "understand" or as "point of view" in design thinking. "Build" in lean startup might be similar to "prototype" in design thinking. And "measure" in lean startup can either be "observe" or "test" in design thinking. This is in-line with the before-mentioned assumption that the lean learning cycle could start at any step of the process model.

And finally, the lean learning cycle might be applied to different levels of a project. On a meta-level, it could be applied to the entire process, and on a micro-level, it could be applied to specific details. That means, it is possible to zoom into sub-processes and execute the lean learning cycle also for smaller design decisions. The design thinking process model, however, seems to be only applicable to the entire problem; not to specific sub-problems.

DETAILED PROCESS MODELS

In addition to these abstract process models, two more detailed process models along with the related process descriptions are compared: a process model for design thinking based on method engineering by Thoring and Müller (2011b), and a process model of lean startup by Cooper and Vlaskovits (2010), see Figures 2a and 2b. These detailed process models along with the descriptions provided by the respective authors allow for a content-related comparison of the two strategies: What is happening within each specific step, what kind of methods and tools are used, and what is the outcome of each step?

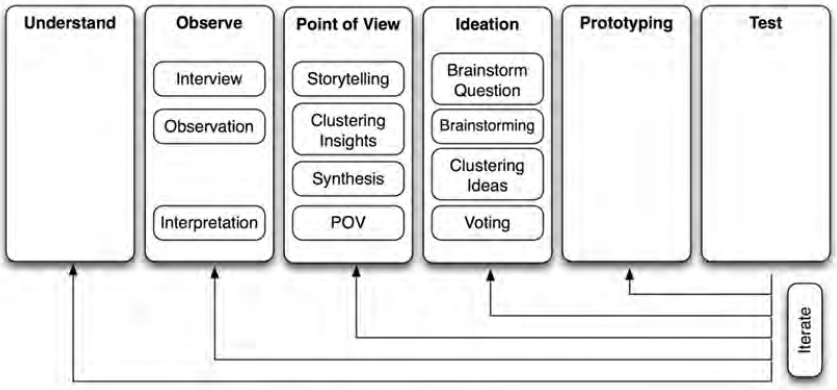

Figure 2a. Detailed process model for design thinking (Thoring & Müller, 2011b) (Cooper & Vlaskovits, 2010).

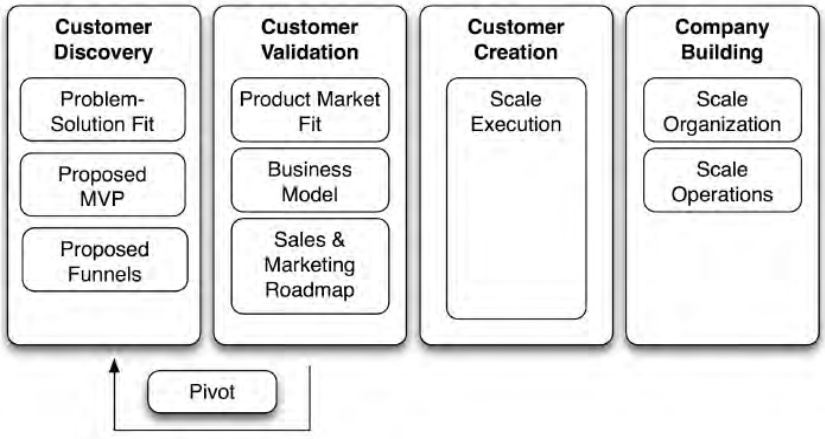

Figure 2b. Detailed process model for lean startup (Cooper & Vlaskovits, 2010).

The model of the design thinking process (Figure 2a) describes the six steps of the process and the iteration loops that result from the last step 'test'. Notably about this process is that it does not start with an idea, but with a problem or a question, instead. Usually the ideas are developed within the process, in the fourth step 'ideation'. Before that, there is an extensive focus on the research, where 'understand' means secondary research and 'observe' means user research. Here, design thinking makes use of research methods from other disciplines such as ethnographic methods and other qualitative methodology. The acquired knowledge is then condensed into a sort of micro-theory about the problem or the user needs, the 'point of view' (POV) that is afterwards used to develop solution concepts in the 'ideation' step. It is here where innovative ideas are developed that aim at solving that previously identified problem or address the users' needs. The selected idea is then visualized or built ('prototype') in order to test it and gather feedback from prospective

users ('test'). According to the feedback the concept is iterated, by returning to one of the previous steps. See (Thoring & Müller, 2011b) for a more detailed description of the design thinking process.

Figure 2b shows a process model, adapted from the four steps of the “customer development” process. Lean startup is a trademark by Eric Ries and combines customer development with ideas of agile software development, lean management (Womack, 2003), and open source software (Ries, 2011). Since there is no explicit process model for lean startup, we refer to the customer development process, which consists of four steps: ‘customer discovery’, ‘customer validation’, ‘customer creation’, and ‘company building’ (Blank, 2006). In the customer discovery phase, the founders discover the appropriate customer group and market segment and validate if the product solves a problem for the customer group. This phase tries to find indications of a so-called ‘problem-solution fit’. The goal is to discover a customer problem and to test if the problem is worth solving (Blank, 2006). Central to this is finding the minimal set of features for solving the core problem: the so-called Minimal Viable Product (MVP). An MVP “is that version of the product that enables a full turn of the build-measure-learn loop with minimum amount of effort […]” (Ries, 2011, p. 77). In early stages of the process, this can be tested and feedback of potential customers can be gathered with e.g. minimal landing pages, paper-prototypes, or early working prototypes. In the customer validation phase it will be checked if the market is saleable and large enough for a viable business (Cooper & Vlaskovits, 2010). The goal is to find some validation of a ‘product-market fit’ and to answer the question if the developed product is something that people want (Maurya, 2012). A product-market fit means that 1) the customer is willing to pay for the product, 2) there is an economically viable way to acquire customers, and 3) the market is large enough for the business (Cooper & Vlaskovits, 2010). After this step, the innovation is validated. The company creation phase is concerned with building a scalable business through a repeatable sales and marketing roadmap (Cooper & Vlaskovits, 2010). In the company building phase, departments and business processes are defined to support scale (Blank, 2006).

ANALYSIS

The following section presents a detailed comparison of both innovation strategies, based on the aforementioned data sources (related literature and case studies, and process models). Table 1 provides an overview and comparison of the important aspects in design thinking and lean startup. We compare the general goals and the specific focus of both methods, the approaches, methods, specific process steps, as well as the respective target groups. More detailed descriptions of the respective similarities and differences of both strategies are provided in the two following sections.

What	Design thinking	Lean Startup
Goal	Innovations	Innovations
Scope, Focus	General innovations	High-Tech innovations for Startup Companies
Approach	User-centered	Customer-oriented
Uncertainty	Solve wicked problems	Unclear customer problem
Testing	Fail early to succeed sooner	Pivoting is at the heart of the 'fail fast' concept. The sooner you realize a hypothesis is wrong, the faster you can update it and retest it.
Iteration	Yes ("Iteration")	Yes ("Pivoting")
Ideation	Ideation is part of the process, solutions are generated in the process	Ideation is not part of the process, product vision is initially provided by company founders
Qualitative Methods	Strong focus: elaborated ethnographic methods, user research, observations, etc.	Not a focus
Quantitative Methods	Not a focus	Strong focus: metric-based analysis; provides matrices, and testing
Business Model	Not a focus	Focus
Adaption of deployments	Not a focus	Five Whys Method
Typical Methods	Shadowing, Qualitative Interview, Paper Prototyping, Brainstorming (with specific rules), Synthesis, etc.	Qualitative Interview, Smoke Test, Paper Prototyping, Innovative Accounting, Split (A/B) Tests, Cohort Analysis, Funnel Metrics, Business Model Canvas, Five Whys, etc.
Hypothesis Testing	Not a focus	Focus
Prototype Testing	Yes	Yes
Rapid iteration	Yes	Yes
Target Group	Users (usually end users, sometimes other stakeholders)	Customers (distinguished between Users, Influencers, Recommenders, Economic Buyers, Decision Makers)

Table 1. Comparison of important aspects of design thinking and lean startup

SIMILARITIES

Innovation Focus: Both concepts have the same goal, which is to foster innovations. Hence, we first take a look at innovations in general. Other than an invention, an innovation is not only something new, but it also proves to be economically viable, technically feasible, and therefore it is successful in the market. Brown (2009, p. 19) describes three criteria for successful innovations. According to this, an idea must be desirable, viable, and feasible (see Figure 3). Many companies focus too much on the latter two—they start either with a new technological invention, or with a business model, but forget to consider the user's view. Many of these concepts fail, because the developed products do not solve an actual problem for the user. Those products are not desirable—nobody really needs or wants them, and hence nobody is going to buy them.

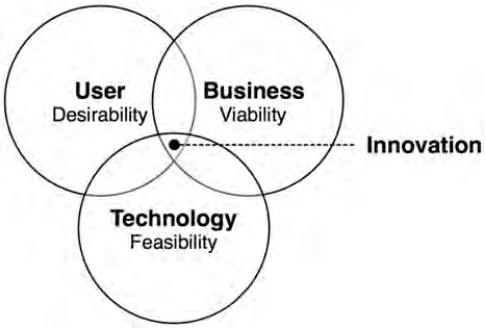

Figure 3. Criteria for a Successful Innovation, adapted from Brown (2009)

User-centered Approach: Both, design thinking and lean startup, take the perspective of the users and other stakeholders into account and focus on extensive user testing in order to improve their respective concepts.

Test Prototypes: Both concepts try to gather user feedback in early stages of the process, in order not to waste lots of resources by building something that nobody wants. Rough prototypes (Buchenau & Suri, 2000; Coyette, Kieffer, & Vanderdonckt, 2007; Walker, Takayama, & Landay, 2002), which can be used for user testing, are a significant similarity of both strategies.

Rapid Iteration: For both strategies, the solution and the problem are quite unclear in the beginning. Both teams work under extreme uncertainty, and the developed prototypes undergo extensive iteration within the process. ‘Fail early to succeed sooner’ is the credo of design thinking, while lean startup describes the ‘fail fast’ concept. Both means, that the sooner you realize an idea is not working, the faster you can update it and retest it, which in fact saves time and money. Lean startup emphasizes the importance of small batch sizes to improve “the speed at which startup find validated learning” (Ries, 2011, p. 188).

DIFFERENCES

Scope: While lean startup is mainly targeting at start-up companies, design thinking is seeking for innovations in general (that could then be turned into start-ups or be utilized somehow else).

Project Initiation: The initial business idea in lean startup is already there from the beginning. It is then tested to check its validity, and can therefore be changed considerably during the project. In design thinking, however, the project starts with a challenge, not with an idea. Typical for design thinking is the goal to solve a so-called wicked problem (Buchanan, 1992; Rittel, 1972), which means that the solution may be quite ambiguous. The problem is not defined until an extensive phase of user and secondary research has been conducted, and the ideas are then generated during the process.

User Research: Design thinking is focusing on extensive user research in the beginning of the project. For this inductive approach it makes use e.g. of ethnographic methods (Kelley & Littman, 2005). In lean startup, however, the use of qualitative research methods is not as elaborate. The project starts with a product vision of the founders.

Synthesis: Design thinking suggests several sophisticated methods for synthesizing insights from the user research (Kolko, 2011). Among these frameworks are ‘Personas’, ‘2-Axis Mappings’, ‘User Journeys’, or ‘Causal Maps’. They help to align the researched information in a qualitative way, in order to condense them into a so-called ‘Point of View’—a kind of micro theory about the user needs, which determines the further direction of the process. Lean startup does not work with synthesis methods and/or qualitative frameworks.

Customers, Users, and Stakeholders: The name of the Customer Development method (which also applies to lean startup) already indicates one of its unique characteristics: To develop its own customers means to find out who might be the early adopters or lead users (Hippel, 1994; Lilien, Morrison, Searls, Sonnack, & Von Hippel, 2002), and what kind of problems they might have that could be solved by the suggested product. Unlike classical ‘product development’ which pretends to know the problem and searches for a (technical) solution to solve this problem, in Customer Development the customer problem that should be solved is not fixed but can be changed and discovered. However, the starting point in lean startup and Customer Development is normally a business idea. Also in design thinking there is no preconceived user problem. However, the process starts with extensive ethnographic user research before any ideas are generated. Lean startup and customer development distinguish between different types of customers (‘users’, ‘influencers’, ‘recommenders’, ‘economic buyers’, and ‘decision makers’) (Maurya, 2012) and market types (‘new markets’, ‘existing markets’, and ‘re-segmented existing markets’) (Blank, 2006). Design thinking only refers to ‘users’, which usually means ‘end users’ or sometimes ‘stakeholders’ and does not use any market typology.

Ideation: Design thinking makes extensive use of classical ideation techniques, borrowed from other creative disciplines, to generate ideas (for example brainstorming and brainwriting). Since lean startup usually starts with a business idea, no ideation techniques are explicitly applied.

Iteration/Pivoting: Both strategies identified the need to modify ideas or prototypes according to user feedback. 'Iteration' in design thinking starts usually after the 'testing' step, towards the end of the whole process, and is performed on the prototype. In lean startup, however, 'pivoting' could be applied much earlier. Even early hypotheses are tested, not only the prototyped idea. Therefore it is possible to determine whether a specific assumption about the problem or user need is correct or not, even before a prototype is created. This might save a lot of time, and resources. In design thinking it may happen, that this insight comes not until the end of the process so that the process has to start over from scratch.

Adaption of deployments: Lean startup has adapted the concept of the *andon* cord of the Toyota production system. In Toyota, the *andon* cord will stop the whole assembly line in case of a quality problem ("Stop the production so that the production never has to stop") (Ries, 2011, p. 227). The equivalent to the assembly line in software development is continuous deployment, which pushes code changes automatically into production. This reduces the cycle time and therefore increases the learning speed. However, even with unit tests that check for errors, unexpected problems might occur. For analyzing problems, lean startup promotes the "five whys" method (Ries, 2011, p. 229). It asks not only for a reason of a problem, but also for the reasons behind the reasons. Then proportionally investments in all these reasons are made. This will help to learn from mistakes and accelerate or decelerate the speed of new deployments.

Quantitative Evaluation: Lean startup is using metric-based evaluation techniques. There are several suggestions of how hypotheses can be tested in a quantitative way (e.g. evaluating the customer acquisition costs by minimal landing pages at a small scale), and there are checklists for product-market fit and MVP definitions (Blank, 2006). Ries (2011) presents "innovation accounting" to measure the progress in validated learning. He warns against "vanity metrics" and defines actionable metrics that are linked to the specific business models. He distinguishes between three "engines of growth" (viral, sticky, and paid) and suggests metrics for each of them. For the measurement of the effectiveness of design solutions often split-test experiments (A/B test) are used. For understanding the longitudinal effect of a design decision on the metrics, cohort-based analyses are suggested. Design thinking does not suggest such metric-based evaluation techniques.

Business Model: Lean startup makes use of Osterwalder's Business Model methodology (Osterwalder & Pigneur, 2010) that helps to systematically align stakeholders (partners, customers), value propositions, required resources, cost and revenue structure, channels, etc. for a startup business model. The business model elements of the canvas are considered as hypotheses that must be tested as early as possible (Blank & Dorf, 2012). Maurya suggests an adapted business model framework called 'lean canvas' (Maurya, 2012). Design thinking does not suggest such a focus on the business model of an idea.

Qualitative Evaluation: Design thinking uses elaborated qualitative evaluation techniques. Testing and user feedback are mainly gathered through qualitative interviews and ethnographic methods. Even though also in lean startup open interviews are used, there is not such a focus on qualitative data. Also the methods to conduct and evaluate these qualitative research methods are not as developed as in design thinking.

SUGGESTED MODIFICATIONS

The literature review revealed that, even though both communities have similar goals, they do not cite and refer much to each other. This shows an opportunity for learning from each other method. Each strategy has its specific target group. It is not suggested to interchange both strategies arbitrarily, since they both focus on specific requirements. If someone has already a business idea

that he/she wants to bring on the market, then lean startup might be the right choice. Design thinking, on the other hand, is the better strategy if you are still looking for the right business idea for founding a company, or if the user problem is still very vague. Still, we believe that both strategies could benefit from each other, since they both involve specific features that the respective other strategy is not considering, but that might be helpful, though. To improve either of the two, the following adaptations are suggested:

POTENTIAL TO IMPROVE DESIGN THINKING

There is potential to improve the design thinking process by converging the two strategies in terms of the iteration. Pivoting as it is practiced in lean startup seems to be a promising opportunity to strengthen the design thinking process. This means to implement feedback testing and iteration loops earlier in the process, even before there is a prototype. This could happen for example after the Point of View or after Ideation. The testing of early problem hypotheses, that can be falsified or validated, might save time and resources, and could result in a better output of successful project results.

Moreover, it is suggested to implement metric-based evaluation techniques as they are commonly used in lean startup. For example, testing in design thinking is mostly performed qualitatively in the analyzed literature. Therefore, checklists or specific test environments that allow for quantitative measuring of user feedback (such as landing page design, smoke-test, etc.) should be implemented in the design thinking process.

Also, it is suggested to develop a business model in addition to the prototype, to validate the viability of the concept.

POTENTIAL TO IMPROVE LEAN STARTUP

Unlike design thinking, lean startup does not describe specifically how customer input could be collected. Qualitative research methods—e.g. ethnographic methods—could be applied to improve the definition of the targeted customers and to identify their needs and problems. Similarly, we suggest adapting the synthesis methods from design thinking. Structured frameworks or the generation of a qualitative persona might help lean startup to better understand and develop their customers and their respective needs and problems. Both should be scheduled at the beginning of the process.

Lean startup could also benefit from the use of ideation techniques, as they are applied in design thinking, to develop concept variations. Although lean startup usually starts with a concrete business idea, it might be helpful to use structured ideation methods to iterate that idea within the process, specifically before the problem-solution fit is achieved.

Consequently, pivoting should be applied earlier (already on the initial concept). And finally, qualitative feedback evaluation, such as qualitative user interviews, could be implemented in the pivoting steps, in addition to the metric-based evaluation techniques.

LEAN DESIGN THINKING

Based on the analysis of the two data sources (literature review and process model comparison), as well as on the before mentioned ideas to improve both strategies, a more radical merging of both processes suggests itself. As a consequence, we propose an interlaced process model that combines the main aspects of both innovation strategies, which we call “lean design thinking”. This suggested adaptation of the two methods combines the most promising aspects of both strategies and addresses the identified gaps. Figure 4 shows this model of lean design thinking, highlighting the respective aspects, adapted from the two original processes.

For example, the first steps of the design thinking process (understand, observe, point of view, ideation) are maintained, prototyping is merged with customer discovery from lean startup (adding aspects like business model generation or funnel proposition), and customer validation from lean startup are added to the end of the process. Testing should be executed after each step, instead of

only once at the end of the process, as it is proposed in design thinking, and it should involve both—qualitative and metric testing methods.

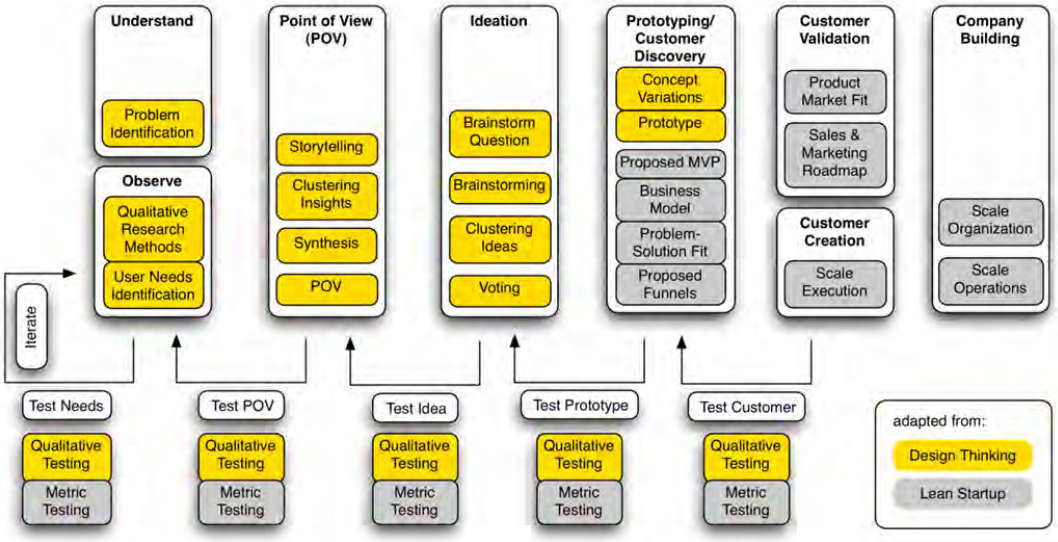

Figure 4. Suggested model of "lean design thinking": Adaption and merging of promising aspects of both innovation strategies.

Creativity and innovative processes can be understood using the evolutionary metaphor (Campbell, 1960; Thoring & Müller, 2011c). The creativity of evolutionary processes can be explained by the combination of generation (variation) and selection of ideas (Simonton, 1999). The previous analysis showed that design thinking has advantages in the generative step (ideation). Even though both processes emphasize the importance of testing, in lean startup the selection of ideas based on quantitative metrics is more rigorous. Because in innovation, generation and selection of ideas are both important, the interlaced "lean design thinking" process, which combines the strengths of both methods, seems promising.

DISCUSSION

The work presented in the article may contribute to a better understanding of both—design thinking and lean startup, and it may help entrepreneurs to utilize either of the two strategies for improving their innovation projects. Practitioners from both fields can use it as a source of inspiration to enrich their innovation strategies by adopting the identified relevant tools and methods of the respective other strategy. For entrepreneurs, innovators, and start-up companies who may want to develop high-tech innovations, it provides a more complete view on innovation strategies in general. For researchers, this article provides an analytical deconstruction of both methods through method engineering, including a comparison, a mapping of both methods, and the identification of gaps, differences and intersections. Educators who may want to teach one of the two methods will also benefit from the detailed analysis. And finally, the article highlights the relevance of innovation strategies in general for management, business innovation, and user-centered design.

LIMITATIONS OF THE PAPER:

We rely our analysis and suggestions mainly on the mentioned literature and published process models. This may not reflect the actual application of the respective processes in practice. It might be that e.g. qualitative ethnographic methods are already well established in lean startup, or that the business model is already addressed in design thinking projects, but since this is not yet explicitly defined in the respective process models and descriptions, these questions warrant further research.

FUTURE WORK

The presented process model of “lean design thinking” is intended as a first step towards a better cooperation between the two communities of design thinking and lean startup, with the goal to adapt and merge interesting approaches of both strategies. Future work will include the application of the suggested process model in a case study, in order to validate its advantages over the separately applied individual processes, as well as structured interviews with practitioners from both communities to analyze the actual application of both methods in practice.

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Calabretta, Gemser, Wijnberg, and Hekkert (2012). *Improving Innovation Strategic Decision-Making Through the Collaboration with Design Consultancies.*

IMPROVING INNOVATION STRATEGIC DECISION-MAKING THROUGH THE COLLABORATION WITH DESIGN CONSULTANCIES

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Innovation and design literature have given limited consideration to the strategic role of design consultancies in the innovation processes of their clients. A plausible explanation is the difficulty to assess the quality of design consultancies' output, given the intangibility of the output itself and the difficulty of connecting a knowledge-intensive output to clients' performance indicators. In this paper we examine design consultancies' impact on their clients' strategic decision-making as a way of capturing design consultancies' strategic role in their clients' innovation efforts. Design consultancies can influence strategic decisions by enhancing three strategic decision-making mechanisms identified by the literature – rationality, intuition, and political behaviour. By examining the Dutch design consultancy industry, we find initial evidence of design consultancies' capability of affecting clients' strategic decision-making. Early involvement in problem definition and long term relationships with clients strengthen design consultancies' influence.

Keywords: Strategic decision-making; Design consultancies; Collaborations

INTRODUCTION

In the era of fast paced innovation, access to external sources of knowledge is essential for achieving higher innovativeness and steady financial performance (Rothaermel and Deeds, 2004). As a consequence, firms increasingly engage in different forms of knowledge-driven inter-firm collaborations for generating and accessing knowledge outside their boundaries (Grant and Baden-Fuller, 2004).

Design consultancies have progressively established as a key external source of specialized knowledge for firms pursuing successful innovation (Cross, 2004; Hargadon and Sutton, 1997). Despite the increasing size of the design consultancy industry, and the growing level of activity at the design consultancies–clients interface, both academic research and business practice developed limited knowledge on how to optimize this knowledge-driven collaboration and maximize its innovation outcome.

There are two main reasons for this lack of progress. First, business practice has limited awareness of design consultants' expertise, given the design consultancies' inability in appropriately packaging and selling their skills and knowledge (Hakatie and Rynnanen, 2004). Second, since design consultancies are professional service firms (PSFs), they are confronted with the issue of transactional ambiguity typical of PSF-client interaction (Alvesson, 2011; Sturdy, 2011). Transactional ambiguity refers to clients' difficulty of quantifying and assessing the quality of PSFs' output – e.g., design consultancy's output - even after its production and delivery. Since

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existing literature and business practice on knowledge-intensive collaborations are based on the measurability of the collaboration output (e.g. patents), it is difficult to conduct empirical research on collaboration with an ambiguous outcome as in the case of the design consultancy-client collaboration.

This paper attempt to address these gaps in both research and business practice by studying the collaboration between design consultancies and their clients from a strategic decision-making perspective. We focus on whether the collaboration with design consultancies can improve clients' strategic decision-making in their innovation practices, by facilitating the decision-making process and/or by optimizing the decision-making outcome. We propose the effect on clients' innovation strategic decision-making as a way of assessing design consultancies' performance, thus suggesting a solution to the issue of design consultancies' transactional ambiguity. We propose that design consultancies may influence the different mechanisms through which clients take strategic decisions, that is rationality, intuition, and political behaviour. By looking at strategic decision-making as the interplay between different mechanisms (rather than the outcome of only one mechanism), we also contribute to strategic decision-making literature and its recent quest for empirical research supporting the integrative approach as a better explanation of strategic decision-making processes (Eisenhardt and Zbaracki, 1992; Elbanna and Child, 2007). We use the Dutch design consultancy industry as a case study to explore design consultancies' influence on clients' strategic decision-making.

The remainder of the paper is organized as follows: first we briefly review the literature areas relevant to our research question, namely strategic decision-making. Second, we describe the empirical setting of our study and the case study methodology used for collecting and analysing the data. Then, we discuss the findings and present a set of propositions. We conclude with our study's limitations and directions for further research.

STRATEGIC DECISION-MAKING

Strategic decision-making research focuses on the processes through which firms take strategic decisions. Strategic decisions are decisions implying high uncertainty in the final outcome, prolonged course of actions, significant resource commitment, and involvement of several decision makers (Eisenhardt and Zbaracki 1992).

Different perspectives emerged for characterizing the strategic decision-making process (for an overview see Elbanna, 2006). In this paper we adopt the more recent *integrative approach*, according to which strategic decisions descend from the interplay between three mechanisms: procedural rationality, intuitive synthesis and political behaviour (Elbanna and Child, 2007).

Procedural rationality characterizes a rational, systematic and linear approach to strategic decision-making. A rational decision-making process implies assessing all pertinent information, evaluating costs and benefits, and, ultimately, making a decision based on conscious deliberation (Dean and Sharfman, 1993; Elbanna and Child, 2007). Although empirical literature has shown that procedural rationality improves strategic decision-making outcome (Dean and Scharfman, 1996; Elbanna and Child, 2007; Miller and Cardinal, 1994; Schwenk and Shrader, 1993), firms are not always able to follow a such a rational process, due to lack of information, environmental uncertainty, and diverging interests among decision makers. As a result, firms tend to combine procedural rationality with intuitive synthesis and political behaviour to select among different courses of action (Nutt, 2002).

Intuition synthesis allows firms to make decisions in situations of time pressure, limited information, and task novelty, namely when a rational decision-making process cannot entirely be adopted (Bingham and Eisenhardt, 2011). In intuition-based decision-making, decisions are taken on the basis of "affectively charged judgements that arise through rapid, non-conscious and holistic associations" (Dane and Pratt, 2007, p.40). The involvement of holistic associations emphasises that the process is not random (as it is the case in guessing), but it consists in non-conscious

recognition of patterns stored in the brain, which then determine the judgement. These patterns are rooted in domain-specific cognitive maps developed by the decision maker through experience. The more a decision maker has experience in a given decision-making area, the more accurate his or her intuition will be (Dane and Pratt, 2007). Thus, highly experienced managers can use intuition almost as effectively as rational judgement (Bingham and Eisenhardt, 2011; Khatri and Ng, 2000). However, empirical research on organizational intuition remains scant, and conclusions on the effect of intuition synthesis on strategic decision-making effectiveness cannot be made.

Political behaviour arises when people use their formal or informal power to influence a decision. It characterizes decision processes in which decision makers have different goals, and the preferences of the most powerful prevail (Elbanna and Child, 2007). Research on political behaviour in SDM is based on the fundamental assumption that organizations are coalitions of people with competing interests. If personal interests are in conflict with those of the organization, excessive political activity can jeopardise a decisional outcome that serves organizational interests. Thus, empirical research generally agrees on the negative effect of political behaviour on strategic decision-making effectiveness (Dean and Sharfman, 1996; Eisenhardt, 1999; Nutt, 1993; Elbanna and Child, 2007).

Though previous research has predominantly focused on one or the other of the above-mentioned decision-making mechanisms – i.e., procedural rationality, intuitional synthesis, political behaviour –, there is an emerging awareness that the single-perspective approach might represent an oversimplification of strategic decision-making's intrinsic complexity. Therefore, several scholars have advocated the desirability of combining different perspectives when investigating the strategic decision-making process (Eisenhardt and Zbaracki, 1992; Elbanna and Child, 2007). We follow this approach and, through our empirical study, we aim at providing insights on how the collaboration with design consultancies can influence the three decision-making mechanisms previously described, and help achieving a balanced combination of the three.

METHOD

We selected the Dutch design consultancy industry as the empirical setting for this research. Given our exploratory aims, an inductive case study approach was considered appropriate (Eisenhardt, 1989; Yin, 2003). Inductive studies are particularly valuable for generating theoretical insights in research areas not appropriately addressed by extant theory, as it is the case with design consultncies (Alvesson, 2011; von Nordenflycht, 2010) and with the integrative perspective on strategic decision-making (Eisenhardt and Zbaracki, 1992; Elbanna and Child, 2007).

Data were collected through: (1) desk research (websites, archival material, reports, etc.); (2) in-depth interviews with board members and senior designers from eight design consultancies; (3) one group interview during which informants from different design consultancies discussed together the topics that emerged during the in-depth interviews; and (4) informal follow-ups with e-mails, phone calls, and reports' discussion. Table 1 provides summary information regarding consultancies, informants and interviews.

Table 2 - Description of Case Data

Firm	Size (N. Employees)*	Respondents	N. of Interviews
A	Medium (85)	Creative director, Brand director Senior designer	6
B	Small (25)	Managing director, Senior designer	3
C	Small (10)	Senior partner, Senior designer	3
D	Medium (80)	Partner	2
E	Large (400)	Creative director	1
F	Small (10)	Managing director	2
G	Small (6)	Partner	1
E	Small (1)	Managing director	2

* According to the EU classification, small companies have up to 50 employees, medium companies up to 250 employees, and large companies more than 250.

We first analysed interviews' transcripts, field notes, and archival data for writing reports for each design agency in our sample. Then we compared across different agencies to find similar constructs and themes (Eisenhardt, 1989; Yin, 1994). We started this comparison after most data had been collected in order to preserve the integrity of the replication logic across interviews (Eisenhardt, 1989; Yin, 1994). As a framework emerged, we compared the findings with the extant literature to pinpoint similarities and differences, strengthen the internal validity of the findings, and refine the definition of constructs and relationships. Thus, we undertook several iterations among different data sources, literature, and emerging findings (Patton, 1990). This iterative procedure resulted in five propositions discussed in the following paragraphs.

FINDINGS

STRATEGIC DECISIONS INFLUENCED BY DESIGN CONSULTANCIES

Our findings suggest that design consultancies affect clients' strategic decision-making beyond their recognized area of expertise (e.g., industrial design, engineering, etc.). During the interviews most respondents asserted that their contribution is certainly prominent in design-focused decisions (product design, prototyping, visual identity, etc.), but it also extends to other strategic decisions. For instance, design consultancies were involved in planning and managing the entire development process of the products they design (from concept definition to implementation), in taking portfolio management decisions, in defining their clients' brand strategy (not only visual elements but especially brand associations and brand identity), and even in suggesting future strategic directions (vision and mission, product/market combinations, inter-firm collaborations). Consistently with previous studies (Miozzo et al., 2011), extending service offering beyond the recognized area of expertise seems to be the prevailing form of organizational growth for PSFs in general and for design consultancies in specific. Historically, PSFs begin with a narrow specialization, whose breadth of application is not initially known and only unveils itself over time. The rationale for this pattern of organizational growth is twofold. As already observed by Miozzo et al., 2011), the first explanation is in line with the diversification argument posited for manufacturing

firms by Penrose (1959) and by adherents of the resource-based view of the firm (Montgomery, 1995): the growth of the firm descends from the economic need of leveraging 'slack' resources, i.e. exploiting underused potential residing in design skills, initially regarded as specialized but subsequently discovered as having a much broader scope of application. The second explanation descends from our data and builds on the intrinsic complexity of design and business decisions, whose scope can rarely be confined to a specific business function or area of expertise. Thus, to maximize the performance of design outcomes, design consultants need to influence other areas of strategic decision-making. Clients understanding the interdependences of strategic decisions and allowing design consultancies to extend their influence accordingly can benefit most from their expertise and the collaboration with them.

DESIGN CONSULTANCIES' IMPACT ON CLIENTS' RATIONAL PROCESSES IN STRATEGIC DECISION-MAKING

Our findings show that firms generally hire design consultancies to fulfil knowledge voids in product design and engineering. In terms of decision-making processes, firms collaborate with design consultancies to get access to as much relevant information as possible for increasing the rationality of design-related decisions. Indeed, when firms use a rational decision-making approach, they strive to consult all the information relevant to the decision area, in order to improve decision alternatives' generation and finally select the optimal one (Elbanna, 2006). Given the uncertainty and the number of knowledge domains affecting strategic decision-making areas (e.g., innovation), firms increasingly turn to external sources – like design consultancies - to achieve information completeness.

Additionally, our results suggest that firms increasingly hire design consultancies because of their knowledge brokering capability – i.e. their capability of learning about potentially useful technologies or product/service solutions by working for clients in multiple industries, and transferring that knowledge into new products/services for industries where there is little or no prior knowledge of these technologies or product/service solutions (Hargadon and Sutton, 1997).

> *"I think that one of the main reasons for our clients to work with us is that we are somehow capable to refresh our knowledge on a very regular basis, and they cannot do that within their own knowledge. There is a lot of what I always call cross-overs. What we learn in one project we can apply in another project [...] We keep repackaging that knowledge in different bundles and offer that to a client to meet their expectations. It's not a quick process." (Partner, Firm D).*

> *"But now we have an article on a newspaper, let's say about our work on in-flight catering, and the following day we would not get phone calls from airlines. We would rather get a bank saying: 'We also have problems with our future! We don't know what to do. We've tried this and that, but maybe we should talk to you, guys". And then we tell them: 'Well, but we don't know nothing about banking', and they answer: 'Exactly, that's why we want you'." (Senior Partner, Firm C)*

Through knowledge brokering firms gain access not only to design consultancies' specific knowledge, but also to knowledge domains never regarded as relevant. According to our interviewees, this not only increases available information, but also facilitates the concluding stage of clients' rational decision processes – i.e., the choice of the optimal alternative - since design consultancies' positive experience in other industries is regarded as valuable evidence for assessing decision alternatives.

> *Proposition 1: Design consultancies facilitate clients' rational processes in strategic decision-making by providing domain specific knowledge and knowledge brokering.*

DESIGN CONSULTANCIES' IMPACT ON CLIENTS' INTUITION PROCESSES IN STRATEGIC DECISION-MAKING

When asked about their most valuable skills for improving their clients' decision making-processes, design consultants often mentioned their ability of visualizing and materializing issues by means of the drawings, sketches and models that they commonly use to support their interpretive processes. According to our respondents, these artefacts help clients to better understand their market and its future direction, to become aware of their core strengths, to detect hidden problems, to comprehend brand associations, and to reduce the perceived uncertainty of developing new offerings.

These examples refer to highly uncertain strategic decision-making areas – i.e., corporate and competitive strategy, branding, innovation – for which firms cannot rely entirely on rational processes, but rather need to turn to intuition synthesis. Using intuition in decision-making is generally regarded as inferior to rational processes (Dane and Pratt, 2007). Material and visual artefacts used by design consultancies can both reduce client's reliance on intuitive mechanisms and, when the previous is not possible, improve the quality of intuitive judgement.

Since material and visual artefacts make observable and explicit the mental processes through which individuals within the organization make sense of things (Rafaeli and Vilnai-Yavetz, 2004), choices previously perceived as intuitive become rational, thus reducing decision makers' reliance on intuitive synthesis.

> *"You can also say that – this is my gut feeling – visualization helped us to make a strategic analysis of what is going on. We were able to transform it [a market opportunity, n.d.r.] into something concrete. Making into something visual made us able to communicate with somebody that was not able otherwise to see that thing. We made that insightful, we made people seeing the problem, understanding the opportunity, what could come in the second step. I think that is one of the stepping stone of our strategic role, I would say." (Managing Director, Firm B)*

Additionally, according to the literature "mature" intuition could be as good as rationality, and it is achieved when decision makers develop, usually through experience, complex cognitive maps of the decision domain (Dane and Pratt, 2007). By making cognitive maps explicit, designers' material and visual artefacts facilitate the sharing and the explicit learning of complex and domain-specific cognitive maps, thus triggering more effective intuitive judgement when using intuition is unavoidable.

> *Proposition 2: Design consultancies' visualization and materialization capabilities (a) reduce clients' reliance on intuition in strategic decision-making, and (b) improve clients' effectiveness in intuitive decision-making.*

DESIGN CONSULTANCIES' IMPACT ON CLIENTS' POLITICAL PROCESSES IN STRATEGIC DECISION-MAKING

In our data collection respondents were frequently confronted with politically powered decision-making, especially in assignments from clients in the public sector or when the client is a group of companies.

> *"Because there are many parties involved – the manufactures, those making the packaging, the distribution system – when we have to introduce an innovation it is always crucial to ask...we try to look for beneficial improvements for every part of the logistic chain. So we work with 5,6 parties all the times. And if one of the parties misses an improvement on it real situation, the whole system falls down."(Managing Director, Firm B)*

Although in presence of strong political powers design consultancies are forced to invest additional resources in negotiation and production of supportive knowledge, they can generally play a facilitator role in power controversies, leveraging on their outsider and expert status.

Empirical studies suggest a negative link between political behaviour and organizational outcomes (Elbanna and Child 2007). Since political power does not necessarily support the optimal decisional outcome, politically driven decisions might be sub-optimal, in the sense that wrong decisions might be taken or decision processes get stuck in power battles. Consistent with previous anecdotic evidence (Sturdy 2011), our data suggest that design consultancies can help to address clients' political bottlenecks by either synchronizing divergent opinions, or reinforcing the authority of commissioning clients, or undermining the political power of opposing parties. As a result, they contribute to legitimise promising ideas and practices and guide clients towards optimal decision-making.

> *Proposition 3: By playing a legitimisation role design consultancies can reduce the negative impact of political behaviour in strategic decision-making.*

CHARACTERISTICS OF THE DESIGN CONSULTANCY-CLIENT RELATIONSHIP: INVOLVEMENT IN PROBLEM DEFINITION

According to several respondents, due to lack of experience, time constraints or political interests clients do not have good skills in problem identification and, thus, in assignment definition. For instance, it is not rare that behind a request for a new product design there is a product portfolio or branding problem that the client is not aware of or not willing to disclose. Since client acquisition often goes through a bid process, there is always great pressure to accept, in broad terms, the client's definition of the problem. However, this neglects the process of translating or re-defining the problem into a form compatible with design consultancies' capabilities and preferred approaches, thus jeopardizing the final outcome of the collaboration. Additionally, it prevents the client from getting access to the broader spectrum of design consultancies capabilities, and from obtaining a thorough outcome offering a long-term solution to a problem that might have been narrowly defined only by mistake or by lack of experience.

In order for clients to benefit from design consultancies' expertise at most, and for design consultancies to perform at their best, a clear and shared definition of the real nature of the problem is essential at the early stages of the collaboration.

Respondents find that time spent in early stages to investigate clients' real needs, to collaboratively define the assignment, and to ensure congruency in clients' and design consultancies' goals and roles is invaluable.

> *Proposition 4: Design consultancies' impact on clients' strategic decision-making is higher when design consultancies are able to influence the breadth and the content of their assignment.*

CHARACTERISTICS OF THE DESIGN CONSULTANCY-CLIENT RELATIONSHIP: LENGTH OF THE RELATIONSHIP

All the respondents agreed that their influence on clients' strategic decision making is higher if there is a long term, trusting relationship. Only after repeated satisfactory transactions clients become aware of the full range of design consultancies' capabilities, hire them for broader and more complex tasks, and ask for insights on more strategic decisions such as e.g. portfolio management.

> *"And we got involved in the discussion about what the impact of the design is in the whole process. And bit-by-bit, clients start to appreciate our role and start to recognize it. And gradually they learnt that our advice could be valuable in the backside of the*

process. And over the years we also started to get an impact earlier in the process." (Partner, Firm D)

Developing long-term, trusting relationships is a condition for success in any kind of inter-firm collaboration. However, the issue is particularly relevant for design consultancies and PSFs in general, given the high level of ambiguity and uncertainty associated with the knowledge intensive nature of these industries (Alvesson, 2011). As explained in the introduction, the design consultancy-client collaboration is characterized by high transactional uncertainty, given the difficulty of assessing the quality of design consultancies' outcomes. Further ambiguity in the relationship is added by the 'institutional uncertainty' still characterizing the design industry (Glückler and Armbrüster, 2003), given the lack of formal institutional standards such as professionalization, industry boundaries, and product standards.

Under conditions of uncertainty, partner choices are driven by personal trust based on previous experience (Glückler and Armbrüster 2003). Once established, experience-based trust enables reciprocal and enduring relations, and organizations will tend to increase the volume of transactions with trusted design partners, by making the collaborations more frequent, but also by broadening their scope.

Proposition 5: Design consultancies' impact on strategic decision-making is higher in long-term design consultancy-client relationships.

CONCLUDING REMARKS

Design consultancies emerged as a key innovation partner in the knowledge-based economy, where successful innovation largely relies on quickly accessing several sources of knowledge (Von Nordenflycht, 2011). However, research progress has been conceptually and empirically hindered by the intrinsic ambiguity of design consultancies' outcome and performance, thus leaving the literature unable to specify the organizational and managerial implications of knowledge-intensive collaborations with design consultancies. By examining the Dutch design consultancy industry, we found initial evidence of design consultancies' capability of affecting clients' strategic decision-making, thus providing some initial insights on how effective influence on clients' strategic decision-making could serve as an indicator of design consultancies' performance. Design consultancies can influence strategic decisions by enhancing the three strategic decision-making mechanisms identified by the literature – rationality, intuition, and political behaviour. Early involvement in problem definition and long term relationships with clients seem to strengthen the influence.

Given the exploratory aim of our research, a case-study methodology was regarded as appropriate and allowed us to gather a rich set of qualitative data. However, the number of respondents is still too small to consider replications and opportunities for theory building (Yin, 2003). In the upcoming months, we plan to extend the analysis in several manners. First, we will extend our data gathering to design consultancies' clients, thus collecting dyadic data capturing the perspective of both design consultancies and their clients on a given assignment. This dyadic approach will shed light on the important issue of whether the design consultancies' impact on strategic decision-making highlighted by this paper is indeed perceived in a similar fashion by the clients themselves. Additionally, this paper describes design consultancies' capability of contributing to clients' strategic decision-making, but the intensity and effectiveness of the contribution is not yet examined. By collecting data on the client perspective we can draw conclusions on whether design consultancies play an advisory role in strategic decision making or replace the clients in making some decisions; and on whether collaboration with design consultancies indeed increases the quality and effectiveness of strategic decision-making, thus improving the overall clients' performance. Analysing dyadic case studies will culminate in creating and testing a theoretical framework of drivers of effective design consultancies client collaboration. With effective strategic decision-making as the dependent variable, drivers can include: design consultancies' skills and

capabilities making them able to effectively influence their clients' strategic decision-making; clients' characteristics facilitating the interaction with design consultancies and the assimilation of design consultancies' knowledge; and characteristics of the design consultancy-client relationship.

ACNOWLEGMENT

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WHAT IS "GOOD DESIGN"?: AN INVESTIGATION OF THE STRUCTURE AND COMPLEXITY OF DESIGN

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Definitions of "Design" abound, yet elaborations beyond such definitions to illuminate what "good design" is are not so easily found. It is understandable that "good design" is amorphous since it may be relative to a particular context, as well as constraints imposed by markets, consumer tastes, technology, and design and business objectives. This article explores the question "What is 'Good Design'?" by relating the findings from a research study conducted with industrial design managers. This research study yielded insights into the nature and possible 'structure' of "good design." In addition to providing a way to be more explicit and precise about "good design," this research provides a foundation for further work in areas such as: scale development, product branding, and other practical tools and insights for design management and research.

Keywords: Good Design; design structure; design definition

INTRODUCTION

For some time now there has been an awareness that design—or rather "Good Design"—is one of if not ***the*** major determinant of success in today's competitive marketplace. With the increased ability of manufacturers across the globe to compete on dimensions such as price and quality, the strategic advantage fostered by "good design" is and will continue to be perhaps the most decisive factor in product success. "Good Design," however, is an open and vague phrase that can mean any number of things, and may vary according to industry, designer, product design context, and so on.

Definitions of "Design" abound, yet elaborations beyond such definitions to illuminate what "good design" is or consists of are not so easily found, and it is not clear that good design is amenable to being clearly defined. It is understandable that "good design" is rather amorphous since it is at least sometimes relative to a particular design or product context, as well as constraints imposed by markets, consumer tastes, technology, and design and business objectives. Nevertheless, if insight can be gained into the notion of "good design," it would seem to be a worthwhile endeavor, and it could undoubtedly yield research avenues along with practical tools. To the extent insights into the definition of "good design" can be gained through a systematic approach that builds in a basis for validity, the utility of such research is heightened.

This article explores the question "What is 'Good Design'?" by relating the findings from a research study conducted with industrial design managers. The study finds that "good design" appears to have a rich, complex, multi-attribute structure. This structure provides a

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way to be more explicit and precise about "good design." It provides the opportunity to examine which attributes or themes are most important in a particular context, and to align the definition of "good design" with the context. Such a structure can further contribute to effective communication about "good design" within the design team, and between the design team and senior management.

After a brief discussion of design definitions and aspects of good design, we describe a study sponsored by the Design Management Institute and present the analysis and findings. The article concludes with a discussion of implications for research and practice.

DESIGN AND "GOOD DESIGN"

Any number of definitions may be cited for the word "design." These may be drawn from a wide range of disciplines—for example, industrial design, graphic design, architecture, packaging design, software design, engineering, production design, service design and so on—engaged in some aspect of the design process. "Design" may be used to refer to either the process of creating a product or the embodiment of a created item (Veryzer, 2010). Various definitions have been put forth for "design" ranging from the relatively concise: "[Design] is a plan for an artefact or system of artefacts" (Gorb, 1990, p. 16), to the industry-market oriented Industrial Design Society of America (IDSA) definition: "Industrial Design is the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer," to expansive definitions such as that of the International Council of Societies of Industrial Design (ICSID) which encompasses "creative activity," "systems," "innovative humanization of technologies," "cultural and economic exchange," "global sustainability," "freedom" (social ethics), "forms that are expressive of (semiotics) and coherent with (aesthetics)," and design as "involving a wide spectrum of professions" (Borja de Mozota, 2003, p. 3). Design awards such as the Industrial Design Excellence Awards (IDEA) published in ***Business Week*** annually, and the Dutch Good Industrial Design Award (GIO), seek to recognize excellence in design by applying various criteria. For example, the IDEA judging criteria include: design innovation, benefit to the user (e.g., performance, comfort, safety, ease of use), benefit to the client, benefit to society, ecological benefit, visual appeal and appropriate aesthetics, and so on. As Gemser and Wijnberg (2002) discuss these awards reflect different selection systems (market, peer, expert) as well as selectors (consumers, producers, experts). Although certainly design awards provide some indication of design excellence—either through formal evaluation criteria or through example by the products selected as award winners—there is not always agreement or consensus as to which designs are most worthy, and the awards are naturally reflective of the perspective(s) or orientations of the body or members judging for the award. In evaluating designs, industrial designers may emphasize creativity and problem solving in their judgments while marketing managers may be more focused on design as a differentiator (Walsh, 2000); and consumers may consider aspects of designs more related to usability and their instrumental goals.

Apart from design definitions and awards our understanding of design—and what makes it "good" —has been elaborated and expanded in a number of important directions. Conceptualizations of "guiding principles" have been posited and applied. For example, Walter Gropius (1935) of the Bauhaus and architect-designer Le Corbusier (1951) advanced ideas on relevant guiding principles for design. Design researchers have also delineated important aspects of design from the user's point of view. Norman (1988) has illuminated effective design by describing properties (e.g., affordances, conceptual models, mapping, feedback) of things/objects that make them more or less understandable depending on how well they are executed in a design. He has also discussed how visceral, behavioral, and reflective aspects of design play a role in how products are designed as well as the reactions

to them (Norman, 2004). Veryzer (1999; 2000) has examined design as it is processed by users or “consumers” of design to yield responses shaped by Non-consciously Acquired Internal Processing Algorithms (NA-IPAs) as well as product design experience properties (Operative, Comprehendative, Constructive, and Desiderative) and attributes (e.g., conformance, proficiency, identity, appropriateness, value). Design has also been discussed in terms of the value that it can add (e.g., Walsh, 2000). It has been recognized as the interpreter of technical possibilities into usable objects or products (Freeman, 1982; Moody, 1984; Walsh, 2000), as well as a means for satisfying customers and thereby delivering profitability to firms (Hertenstein & Platt, 1997; Gemser & Leenders, 2001; Hertenstein, Platt & Veryzer, 2005). Interestingly—or curiously, it seems to accomplish these tasks in a myriad of ways (designs)—which contrast even as they coexist (e.g., Postrel, 2003, p. 11).

Although “design” has been reasonably well defined as a concept, “good design” appears to be more difficult to articulate and remains amorphous. Whether there can be a definitive explanation of “good design” seems an open question that will constantly be challenged by changing styles and fashions over time as well as evolving technological capabilities (for executing designs) and needs (in terms of the types of products demanded by consumers). However, despite the difficulty in defining “good design,” it would seem a worthwhile endeavor to explore industrial designers’ conceptions of “good design.” Toward that end, the Design Management Institute sponsored a study in order to gain insight into the phenomenon.

METHODOLOGY

PARTICIPANTS AND DATA COLLECTION

A questionnaire was administered to industrial design managers attending the October, 2006 Annual International Design Management Conference sponsored by the Design Management Institute.[i] These conference attendees were members of the Design Management Institute who typically have worked in industrial design for several years before taking on the responsibility of managing a design group in a company or design consulting firm. These experts tend to be (hyper) sensitive to industrial design not only as it relates to products they design but also generally. The conference participants were asked, “Please tell us your definition and criteria for “good design” (please be as specific as possible in listing aspects/elements of “good design” in your view).” This question was part of a more extensive questionnaire which had previously asked participants to rank-order firms in each of nine industries based on the participant’s criteria for “good design,” and to discuss the role and influence of design within their own firms. Of the 121 managers who responded to the questionnaire,[ii] 109 managers responded to the above question with their definition and criteria for “good design.”

DATA ANALYSIS

We analyzed the content of the 109 managers’ responses for common thoughts or ideas that would enable us to categorize the responses into major conceptual themes. Because design managers typically responded with several distinct thoughts linked to good design, responses to this question about definition and criteria for “good design” were open coded (Strauss & Corbin, 1998) using thought units as the unit of analysis. Once coded, we analyzed the data inductively and categories emerged using constant comparative analysis (Glaser & Strauss, 1967; Strauss & Corbin, 1998). We generated categories from the data (Erickson, 1990) once similar themes emerged from multiple respondents. This method is consistent with Owen’s (1984) determination of a theme in terms of its recurrence, repetition, and forcefulness. By noting the themes and patterns that emerged (Miles & Huberman, 1994, p. 246) and through clustering (p.252) of data, we created broad categories of

characteristics that represent criteria that design managers use to characterize good design. The analysis was conducted in multiple rounds. Themes and thought units were identified in the first round, and refined in later rounds during which we also analyzed the relationships among the themes and identified clusters of related themes. After researchers agreed on the identification of thought units and themes, two researchers independently coded the data and the reliability of these categories was determined by computing a coefficient of agreement. Between coders, Cohen's Kappa inter-coder reliability score (Cohen, 1960) was 97.8% based on the independent coding of 418 pieces of data (thought units).

Although the questionnaire did not specifically ask the respondents whether they worked for a design consultancy or were members of a corporate design group, the researchers observed that most respondents voluntarily included this information in their responses to open questions on the questionnaire. To compare responses from corporate and consultancy respondents, two researchers and a research assistant independently analyzed the content of the respondents' responses to all qualitative questions and coded each respondent as corporate, consultancy, or other (where other included academics, government employees, and respondents whose type of employer could not be determined). Where coding differed among the three coders, they first attempted to resolve the differences, but when differences could not be resolved, the respondent was coded as "other." Thus, respondents were categorized as corporate or consultant only if all three coders agreed to that categorization.

RESULTS

The average number of thought units for the 109 managers who answered the question requesting the definition and criteria for "good design" was 3.8; the median was 3 thought units per person (see Figure 1). Of the 109 managers who answered the question, 30 were coded as consultant, 63 were coded as corporate, and 16 were coded as other. The range for consultants was 1 to 10 thought units; the average per consultant was 4.2. The range for corporate respondents was 1 to10 thought units; the average per corporate respondent was 3.3.

[i] The Design Management Institute is a nonprofit organization dedicated to assisting industrial design managers in becoming leaders in their profession, demonstrating the strategic role of design in business, and improving the management and utilization of industrial design (http://www.dmi.org).

[ii] The 121 respondents comprised nearly all of the design managers attending the conference.

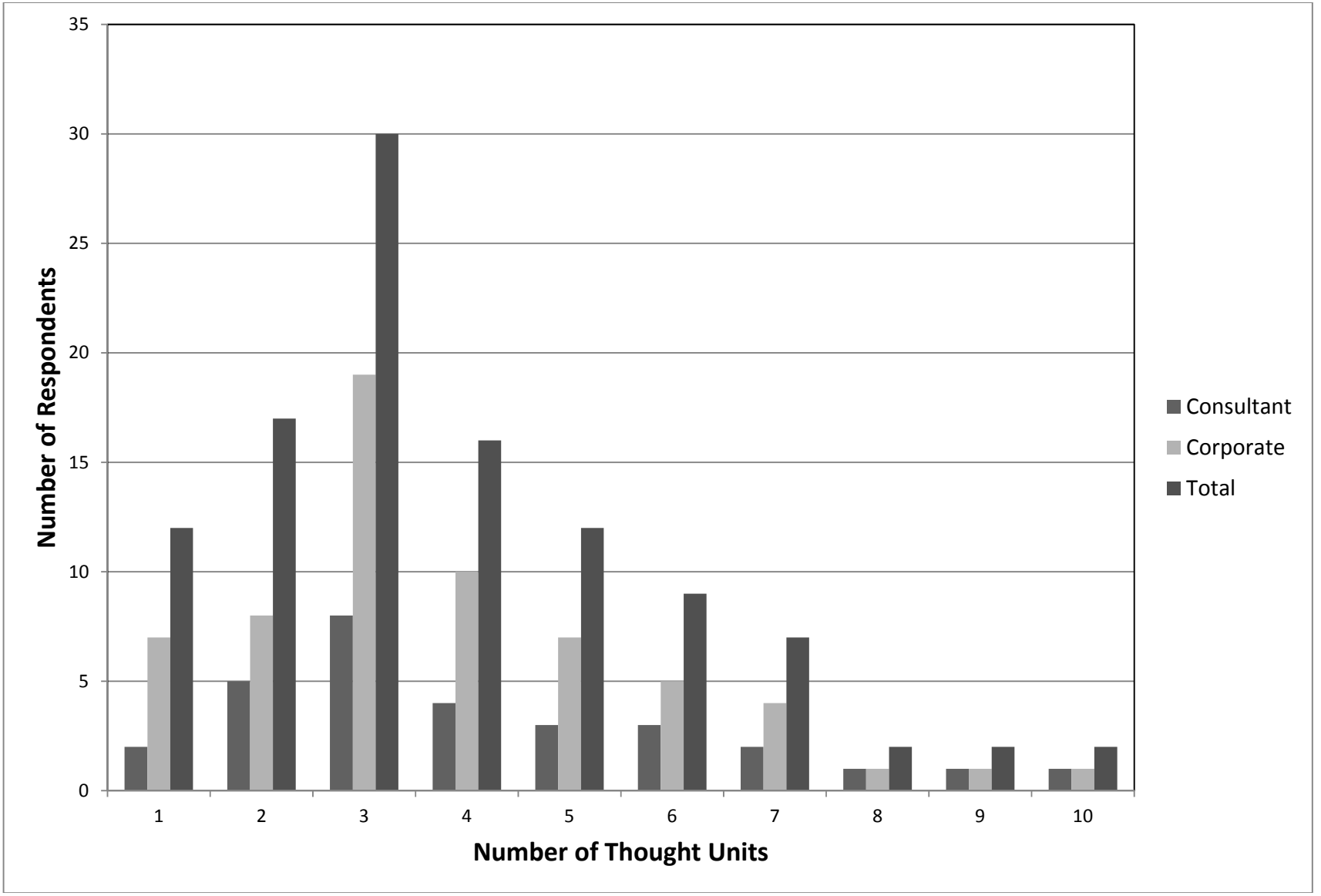

Figure 1 *Number of thought units per respondent.*

Our analysis of the design managers' thought units yielded 24 themes. We identified fourteen themes related to the customer experience, and ten themes focused on the company. Further analysis also suggested that while the themes were distinct, some themes were related to other themes. For example, "ease of use" is related to the concept of a design being "functional," and "ergonomic" might contribute to "ease of use." Thus, the analysis proceeded to group related themes together to identify broader patterns and to help comprehend and make sense of the large number of themes. The related themes clustered (Miles & Huberman, 1994, p.252) into seven broader (response) categories that characterized good design: form, function and usability; customer perspective; emotions and feelings; business performance; business differentiation; brand and brand history/evolution; and sustainability. Table 1 identifies the themes in each of the seven categories, and shows representative thought units for each theme. The relationships among the themes are illustrated in Figure 2. Table 1 and Figure 2 essentially provide taxonomy of the themes because they group themes based on what the themes have in common.

Table 1. Design Manager Responses Indicating Definition and Criteria for “Good Design”

Response Categories	Themes	Related Themes
Form, Function and Usability	Aesthetics “Aesthetic” “Aesthetically pleasing” “Exhibits excellent color usage, visual pacing, typography” “Form” “Attractive” “Feels good to the senses (touch, eyes specifically)” “Elegant” “Beauty” “Clean” “Good dimensional composition” “Look and feel” Functional “Functional” “Does the job it was designed to do” “Helps people complete tasks” “Functions like I need” “Usefulness/usability” “Solves a problem” “Works well” “Delivering a solution” “Offers utility”	Reflects Period “Contemporary” “Modern” Form-Function Relationship “Form and function are in balance” “Good design relates to an artifact that is both aesthetically and functionally pleasing to the consumer/user” “Works first, looks good second, but must have both” “Combination of function and beauty – maximizes the contribution of both” Ease of Use “Ease of use” “Intuitively usable” “Simple for end-user to use/understand” “User friendly – consumer focused” “Simple” “User friendly” “Clear user interface” “Logic” Communicates Effectively “Clear in its communication” “Simple expression of compelling idea” “Clear communication of product goals” “Communicates” “Purpose clearly expressed” Ergonomic “Ergonomic” “Good ergonomics” “Human factors for product’s use” “Human-centered”

Response Categories	Themes	Related Themes
Customer Perspective	Customer Awareness/Experience “Customer appeal” “Deep customer empathy” “Meets and surpasses the end user’s expectations and perceptions” “Satisfies the customer’s needs” “Rooted in my individual physical, emotional, cognitive, cultural and environmental needs” “User experience” “Considers all aspects of the user experience” “Good design show attention to my experience of the product”	Provides Value to Customer “Good value” “Best value” “Cost/performance” “Fair price” “It provides a good value proposition (cost to satisfaction ratio)” Quality “Quality” “Well made, durable products” “A lasting life cycle (quality)” “High quality” “Durable Makes Life Better/Simpler “A deep, detailed concern for creating better life experiences” “Simplifies life” “Makes life better/happier”
Emotions and Feelings	Emotional Bond “Automatically creates a ‘bond’ with the consumer” “Delights consumers” “Brings joy to people” “Enduring emotional connection with consumers” “Emotional resonance” “Emotionally compelling” “Elicits emotional reaction/connection” “Touches heart”	Positive Impact “Memorable products” “Creates positive experiences” “Meaningful impact associated either with the product itself or the experience around the product” Desirable “Desirable” “High desirability” “Rooted in human desires”
Business Performance	Business Profits/Results “Profitable for company” “All of this will lead to a better ROI” “Business success” “Contributes to business objectives” “Good design is design that sells”	Appropriate for Market, Culture “Captures values ascendant in the culture” “Appropriate to market” Appropriate to Product “Suitability to its end purpose” Good Design Process “Design focused discipline”

Response Categories	Themes	Related Themes
Business Differentiation	Innovative/Creative/Differentiated “Differentiated from the competition” “Innovative” “Creative solutions” “Unique” “Product innovations” “Strong product differentiation (unique)” “Fresh” “Unexpected” “Different: is it more of the same or new/different/makes me stop in my tracks” “Distinct”	
Brand and Brand History/ Evolution	Brand “Enforces brand persona” “Brand recognition” “Reflects the image and meaning of the brand” “Unification of brand and product & service experience” “Brand experiences”	Consistency of Product Design & Representation “Consistent representation in product, marketing, message” “Continuity of a historical design” “Consistency” Evolving History of Design “History or legacy of good design” “Drive forward the progression of design” Enduring Design “Timeless and transcends fads” “Do they embody lasting design qualities?” “More than a short-term vision” “Classic”
Sustainability	Appropriate Environmentally/Ethically “A positive impact on the environment” “Socially responsible (ecological + sociological)” “Earth friendly” “Sustainability”	

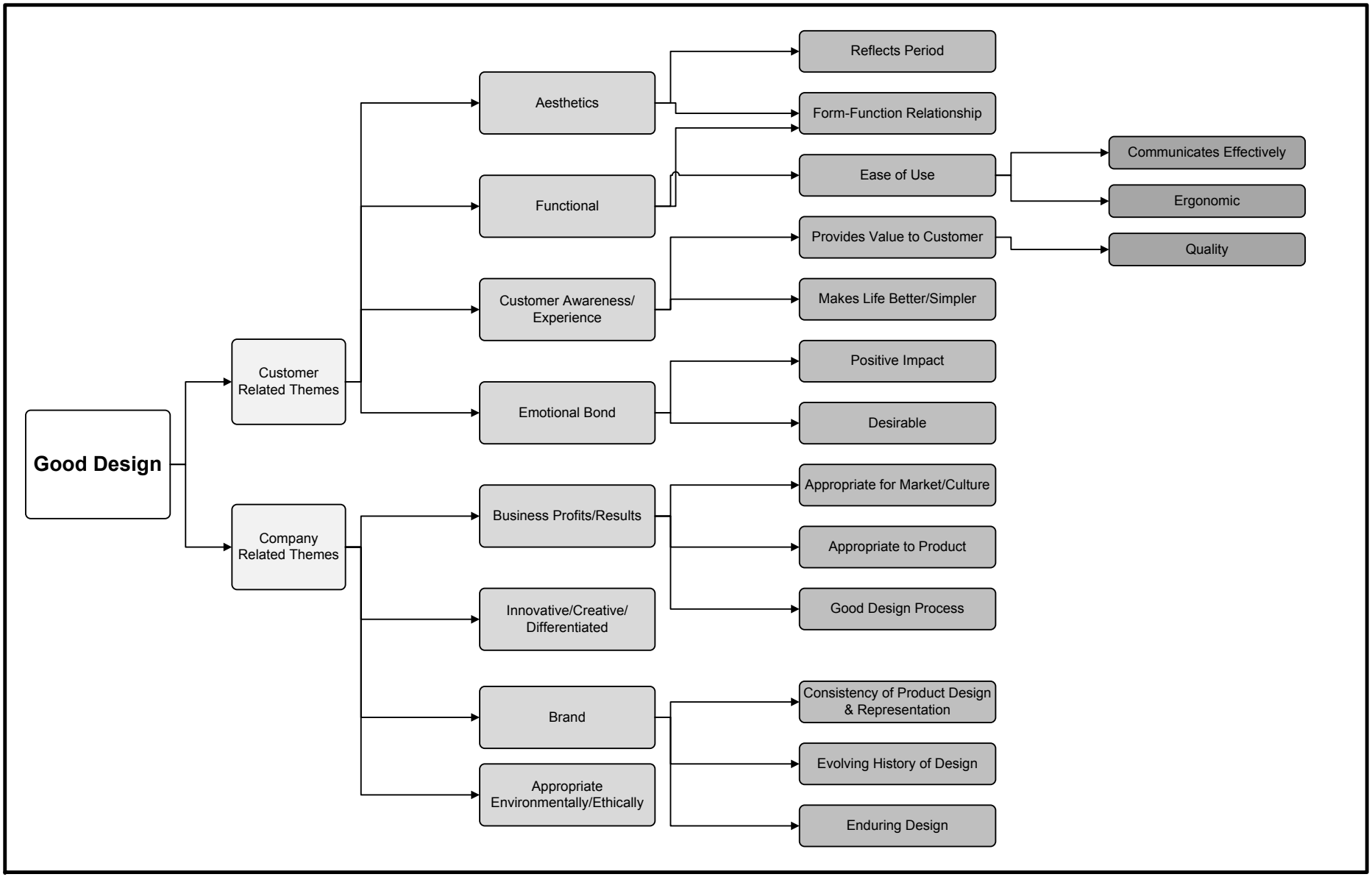

Figure 2 "Good Design": Themes and Relationships

Some themes were articulated more frequently than others. We examined how often a theme was mentioned, i.e. the number of thought units assigned to that theme as a percentage of the 418 total thought units. These data are shown in Figure 3.[iii]

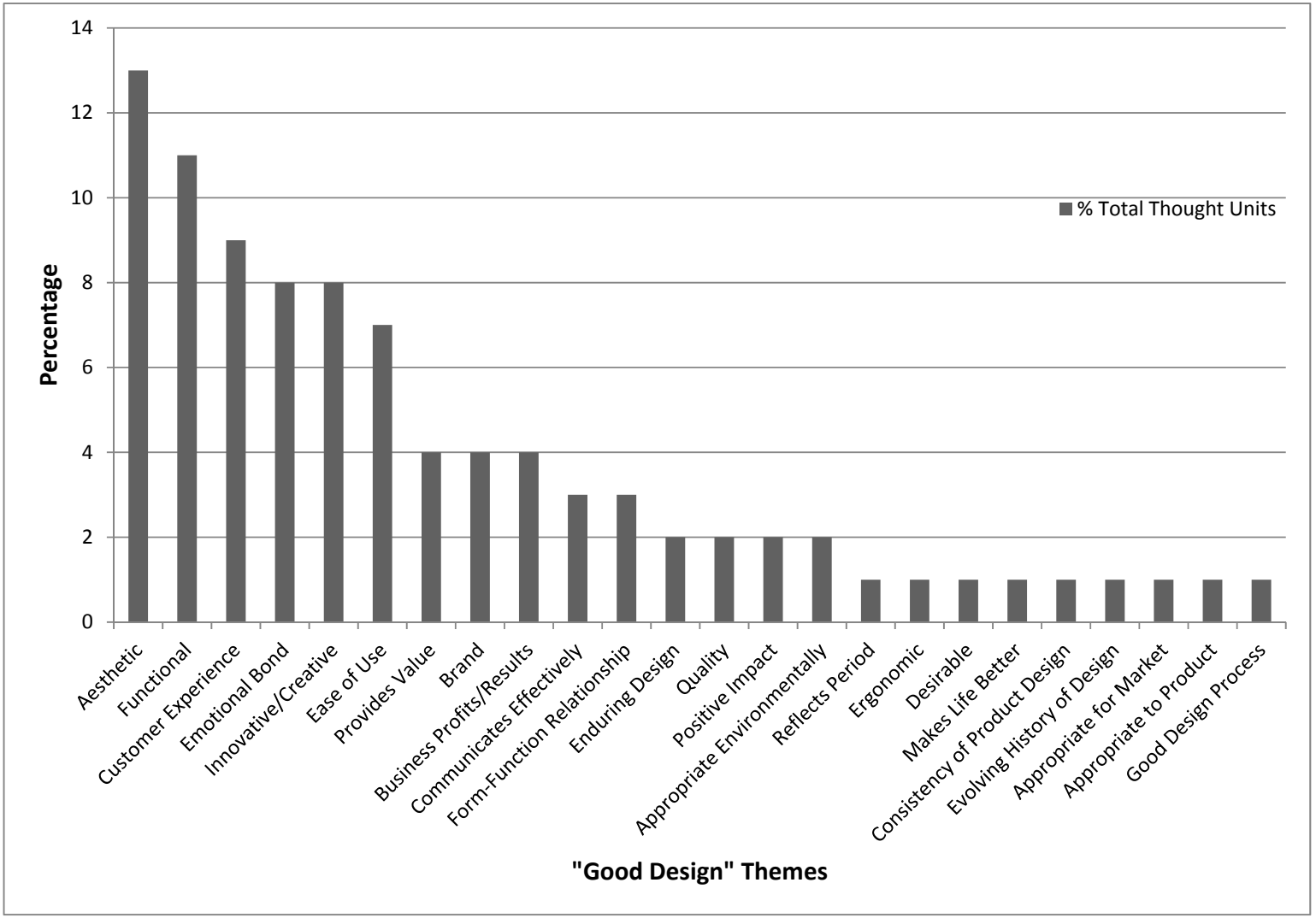

Figure 3 “Good Design” theme frequencies.

[iii] We also examined the proportion of respondents who mentioned a theme. The two measures had quite consistent patterns: themes with the high were also mentioned by the highest percentage of respondents. This suggests that in analyzing the thought units, the data are not skewed by a few particular theme numerous times.

We identified the top three tiers of themes based on the percentage of 418 thought units coded as belonging to that theme as shown in Table 2. Two themes represented more than 10% of the thought units: Aesthetic and Functional. Four themes represented 7-9% of the thought units: Customer, Emotional, Innovative, and Ease of Use. Five themes represented 3-4% of the thought units: Value, Brand, Business Results, Communicates and Form-Function.[iv]

Table 2. Themes Most Frequently Mentioned

	Frequency	**Themes**
Tier 1	> 10%	Aesthetic; Functional
Tier 2	7-9%	Customer; Emotional; Innovative; Ease of Use
Tier 3	3-4%	Value; Brand; Business Results; Communicates; Form-Function

We further analyzed the responses provided by corporate respondents and those provided by consultants. Figure 4 shows the number of thought units assigned to each theme by each group as a percentage of the total thought units for that group. As Figure 4 shows, there is considerable similarity in the profiles of responses from corporate respondents and consultants.

[iv] The percentage of respondents who identified a theme is larger than the percentage of thought units coded as belonging to that theme because most respondents expressed more than one thought unit when characterizing “good design.” For example, Aesthetic and Functional were identified by 37% and 33% of the 109 respondents, respectively, while they represented 13% and 11% of the 418 thought units, respectively.

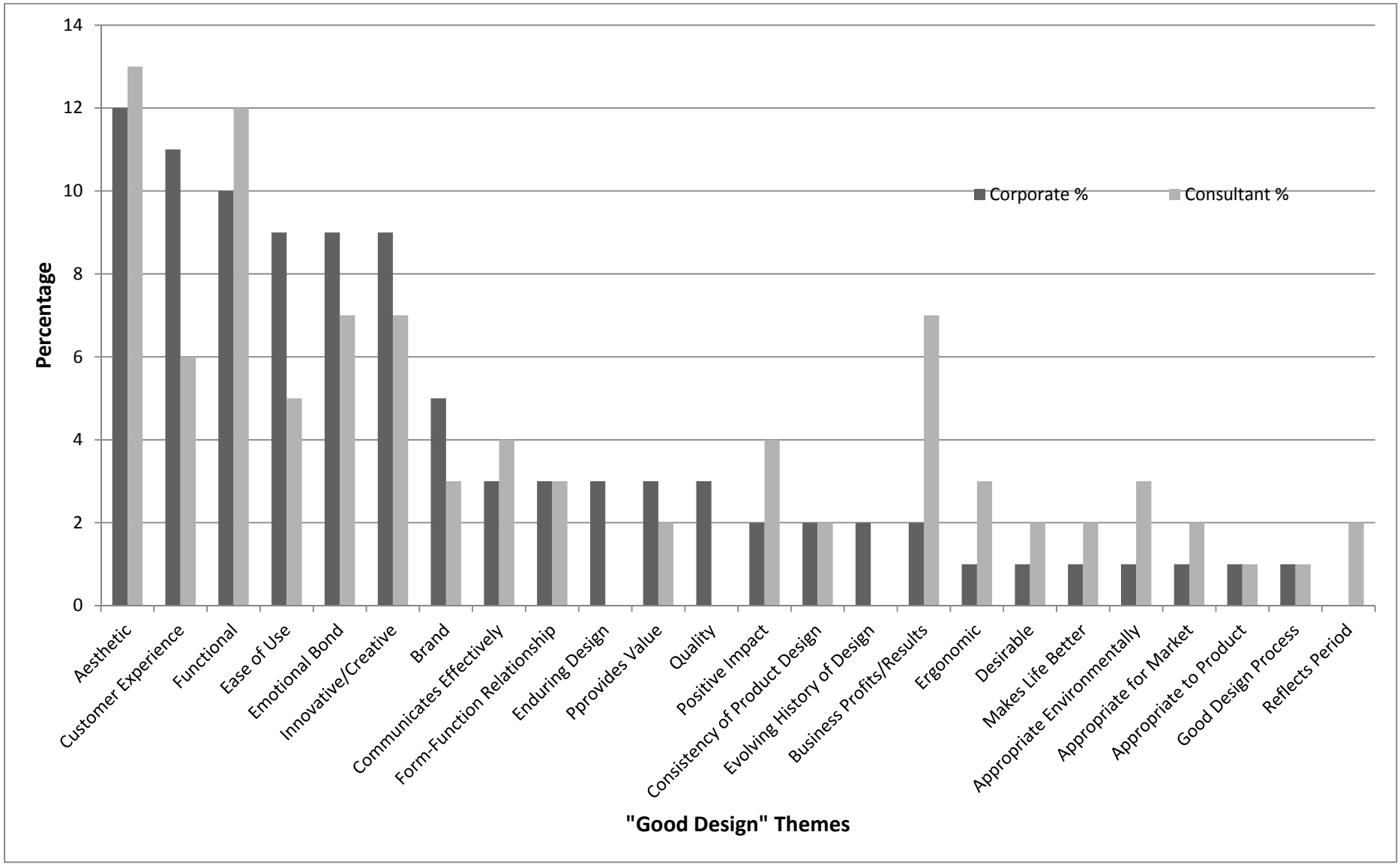

Figure 4 *Theme frequencies: Corporate vs. Consultant responses*

DISCUSSION

The definition of “good design” is both rich and complex. The richness is evident in the total number of themes (24) and categories (7) that emerged from the analysis and in the number of thought units per respondent as each design manager attempted to characterize “good design.” The complexity of “good design” is suggested by the variety and diversity of themes that were identified, ranging from aesthetics to sustainability to emotional bond to business results. The potential conflict among some of the themes is further evidence of the complexity of “good design.” For example, some themes relate to customer experience while others relate to business results which can, at times, require trade-offs between competing goals and interests (e.g., quality vs. cost/profit). Furthermore, there is potential conflict between “innovative/creative/differentiated” which suggests that “good design” should be fresh and unique, and “brand” and “consistency of product design and representation” which both suggest a need for consistent, predictable approaches.

Despite the richness and complexity, the importance and primacy of the customer experience as critical to “good design” emerges through the analysis. Customer experience accounts for 14 of the 24 total themes. Further, both top tier themes relate to customer experience, as do the majority of themes in the second and third tiers. The design managers’ responses suggest that design is “good” only if the customer can experience its “goodness” in ways ranging from beauty to ease of use, and from quality to emotional connection. Although customer experience is critical to “good design,” the company focus is also important; the company focus needs to be balanced against customer experience—although in some instances it is rather synergistic with customer experience. For example, enduring design may relate to providing value to the customer as well as to a product being desirable.

Further, “good design” requires designers to simultaneously address and balance many themes. Although the top tier themes, aesthetics and function, have the most thought units, together they represent less than 25% of the total thought units suggesting that “good design” is much broader than aesthetics and function alone. The design managers explicitly recognize the need for balance among key themes; for example “form-function balance” (which links the “aesthetics” theme and the “function” theme) itself emerges as an important theme. It is clear that to be judged “good design” by these experts, the design must succeed on multiple dimensions.

As noted earlier, when we compared corporate respondents and consultants, the profiles of their responses were quite similar. For example, Aesthetic is ranked first by each group, and Functional ranks third and second, for corporate respondents and consultants, respectively. Nineteen of the 24 themes are within two percentage points for the two sets of respondents. For those themes that differ by more than two percentage points between these two groups, the corporate respondents generally have the higher percentage for the customer-related themes (customer awareness/experience, ease of use and quality) while the consultants have the higher percentage for the business profits/results. It is interesting that, where they differ, each group appears to place a higher emphasis on its direct customer.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

STRUCTURE OF “GOOD DESIGN”

The themes and categories identified in Table 1 and Figure 2 provide a sense of what underlies the notion of “good design.” Beyond identifying the themes and categories that underlie “good design,” there are a number of interesting and potentially important research implications that stem from this work. Among these is that “good design” may have a

structure as suggested by Figure 2 and Table 2. Further, the frequencies giving rise to the tiers in Table 2 suggest that the structure may be hierarchical. Thus, assessments of good design would seem likely to be dependent on the "structure" of the "attributes" – e.g., their position in the hierarchy and potential "linkages" among them. Further, hierarchy and inter-relationships within levels of the hierarchy, as well as inter-relationships between concepts at different levels, suggest an underlying complexity essential to fully formulating and understanding "good design", as well as to any attempts to formulate design as a construct or conceptualization in order to study it (for example, examine hypotheses). As a result, perceptions of "attributes" or characteristics of a design may depend on how well the specific product design solution reflects or conveys what have been reported in this work as "design themes," as well as relationships between or among the design themes.

Along with the view of "good design" as being affected by an underlying structure that may give rise to such perceptions, there are a number of important considerations suggested by this research. First, this research provides a way to be more explicit and more precise about "good design." Further, what is judged as being "good design" may vary by or across different demographic groups, market segments, or cultures as well as product/industry contexts; those individuals assessing or encountering a design may weight the themes differently in different contexts. Thus, the structure of "good design" identified in this paper provides a foundation for future research examining which themes are most relevant and how important they are in a particular context. Understanding contextual differences will help to align the themes – and the definition of "good design" with the context.

HOW PEOPLE PROCESS DESIGN

Somewhat related to this structure are possibilities concerning how people process design. The various design themes identified for "good design," as well as the categories, inter-linkages and structure (or possibly even hierarchy) raise interesting questions relating to individuals' decision processes in encountering designs. It may be that whether consciously or not, people evaluate designs as being "good" or "bad" in a manner somewhat similar to that used generally in making decisions.

"Decision rules" or "decision heuristics" refer to various approaches that people use to consider and decide about things such as products they encounter (Park, 1976; Wright, 1976). The rules are used in comparisons across alternatives in a choice set (for example, a selection of toasters a person may encounter at a store). In comparing several competing models or makes of a product one could select the model that is best on the most important attribute (Lexicographic decision rule), eliminate any models that lack or fall short on a key attribute (Elimination-by-Aspects decision rule), make a selection based on the model meeting a minimum standard for each attribute (Conjunctive decision rule), choose the alternative that has the largest number of positive or acceptable attributes (Compensatory decision rule), or even employ a mixture of two or more of these types of (decision) rules.

The degree to which such processing enters into judgments of "good design" remains unclear; however, that design processing involves some consideration or interplay in assessing and weighting "themes" and perceiving design characteristics at least at a non-conscious level seems likely. Although such relationships and processes may be difficult to detect given the gestalt nature of individuals' reactions to designs (Berlyne, 1971; Veryzer, 1993), a further understanding of such processing may be integral to significantly advancing both design theory and practice.

BRAND-EMOTION LINKAGE

In addition to suggesting the complexity and some aspects of the likely structure of "good design," this research offers insight into specific research areas. The responses of the

sample suggest inter-linkages among Aesthetics, Function, Emotion, and Brand, e.g., “Good design relates to an artifact that is both aesthetically and functionally pleasing to the consumer,” “Meaningful connection between brand and consumer.” Exploring and understanding these may provide lucrative research avenues and may have practical implications.

One especially important and promising research avenue concerns the Brand—Emotion link. Guidelines for effective brand management suggest that creating an emotional bond is a key to establishing a brand connection with the consumer (Keller & Lehman, 2006; Keller, 2007). Thus, brand managers emphasize emotional connections with the brand, for example, the emphasis on caring and nurturing that appears in advertisements for Campbell’s soup. This suggests design researchers as well as other researchers (e.g., consumer and marketing researchers) might do well to consider the potential of design to establish links between brand and emotion and incorporate this into their research, especially since both brand and emotion emerged as important themes in “good design.” Likewise, design practitioners or managers may be able to use recognition of such relationships to glean valuable insight into the likely success of proposed designs in terms of how these inter-linkages are revealed in different design executions.

SCALE DEVELOPMENT AND DESIGN ASSESSMENT

Another potential avenue for this work involves scale development and design assessment. This work would seem to be relevant for scale development for assessing good design, consumer reactions to design, design measurement (measurement of specific design aspects, properties, or characteristics), and for testing design(s). Advances along these lines may further facilitate the formulation and testing of propositions and hypotheses concerning how various (design/product) characteristics are best manifested in a design.

ALIGNING DESIGN OBJECTIVES

Although all of these research implications would seem to have the potential to lead to useful, practical tools and insights for design managers, the understanding gained into the complexity and structure of “good design” would seem to offer immediate applications as a means to better align design objectives between individuals involved in a design project. Having a shared understanding or definition of “good design” can be essential to the success of a design team and helpful in resolving conflicts between inter-disciplinary design team members. The themes and categories identified in Table 1 and Figure 2 suggest at least a possible or starting definition for “good design” which may be modified by the design team to emphasize the particular aspects relevant to its particular industry or application. Such a list of themes or attributes provides a more delineated definition of “good design” which can help achieve the alignment of design goals with design outcomes in terms of a particular product design or design proposal. The list of themes can be used as a tool for discussing attributes to be included in a design, guiding the design process, and evaluating proposed designs.

Similarly, a design consultancy dealing with a client must be explicit and must be able to articulate the design to the client. The themes and structure identified in this research can help identify and gain consensus on critical aspects of the client’s application. In fact, the similarities in the theme profiles between the corporate respondents and the consultant respondents (Figure 4) discussed above suggest that there is some degree of alignment between how these two groups view “good design.” This may, in itself, be beneficial in their communications and in gaining consensus on proposed designs. Furthermore, the themes, and to the extent there is a structure or even a “design hierarchy,” may aid in explicit identification (and discussion) of the relationships/inter-linkages between concepts which in a sense “produce” (perceived) qualities in a designed product and a final design solution that is realized.

LIMITATIONS

The organization of the themes in Figure 2 – including the determination of whether the theme was company-related or customer-related – was based on the consensus judgment of the researchers. It is possible that others might make different judgments resulting in alternate layouts or organizations of the themes. This could result, in part, from the complexity of design discussed earlier and the reciprocity between some of the themes. For example, we view Brand as a company-related theme as companies create brands to make it easy for customers to identify – and purchase – their products. However, some designers may view Brand as tying in with user desire, need, or trust and thus to be part of the user experience. Finally, despite the consistency in the theme profiles between consultants and corporate respondents in this sample, different groups – for example, designers from different industries or different disciplines (e.g., automotive exterior design, furniture design, graphic design) – might weight these themes or dimensions differently.

Even while academic explorations such as this have their place and can often yield useful, practical tools for design managers' benefit, care should be exercised so as not to lose sight of the fact that for centuries craftspeople and then designers have consciously or not incorporated at least an intuitive sense of relationships such as these into their designs and work. Thus, although we believe some useful insights and tools are suggested by this research, we are equally excited about simply enhancing the understanding of the phenomenon of "good design."

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[i] The Design Management Institute is a nonprofit organization dedicated to assisting industrial design managers in becoming leaders in their profession, demonstrating the strategic role of design in business, and improving the management and utilization of industrial design (http://www.dmi.org).
[ii] The 121 respondents comprised nearly all of the design managers attending the conference.
[iii] We also examined the proportion of respondents who mentioned a theme. The two measures had quite consistent patterns: themes with the highest percentage of thought units were also mentioned by the highest percentage of respondents. This suggests that in analyzing the thought units, the data are not skewed by a few individuals who identified a particular theme numerous times.
[iv] The percentage of respondents who identified a theme is larger than the percentage of thought units coded as belonging to that theme because most respondents expressed more than one thought unit when characterizing “good design.” For example, Aesthetic and Functional were identified by 37% and 33% of the 109 respondents, respectively, while they represented 13% and 11% of the 418 thought units, respectively.

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AN ANALYSIS OF DESIGN MANAGEMENT PRACTICES IN EUROPE - A CRITICAL INVESTIGATION OF THE DESIGN MANAGEMENT STAIRCASE MODEL

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The research presents a critical investigation of the Design Management Staircase model to assess current Design Management practices and capabilities of European businesses. Based on the literature it assesses the Design Management Staircase model regarding its suitability as a method to assess current DM practices of European businesses. Furthermore, it applies the Design Management Staircase model to four different datasets obtained from European Businesses each year from 2008-2011. It explores the development of the trends in the Staircase model scores. Further analyses are conducted examining differences in Staircase scores of businesses recognizing design and design management as an important tool for innovation.

Keywords: Design Management capabilities, Design Management Staircase Model; Innovation

INTRODUCTION

This paper presents a critical investigation of the Design Management Staircase model (Kootstra, 2009). The Design Management Staircase model was developed during the Award for Design Management Innovating and Reinforcing Enterprises (ADMIRE) programme as part of the PRO-INNO Europe initiative formed by the European Commission (EC) Directorate General for Industry and Enterprise. Despite finding evidence of a positive correlation between Design Management (DM) and business performance, the EC identified a substantial lack of knowledge concerning the manner and extent to which European businesses integrate design into their management structures. Therefore, it was one of the key objectives of the ADMIRE programme to investigate the current DM practices of European businesses and to identify obstacles preventing businesses from implementing DM structures.

In the absence of a validated model to assess European businesses' DM capability, the Design Management Staircase model was developed by Kootstra (2009). The model aims to enable European businesses to assess and improve their DM capabilities in order to increase their effective use of design and improve their competitiveness and business success. To assess DM capabilities a process perspective was taken, classifying the DM capabilities of businesses into four different levels, ranging from an immature stage, level 1, through to level 4, where design is managed strategically. All four levels are further defined by five factors influencing the success or failure of design and indicating good DM. The level ranking is dependent on the extent to which

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businesses implemented these five factors. Each of these factors are explained through three to four multiple choice questions. Subsequently, the Design Management Staircase model was tested on a large scale study amongst 605 European businesses. The results of this study were presented in Kootstra's (2009) report "The Incorporation of Design Management in Today's Business Practices".

However, the rationale for the model's levels and factors has never received any academic interrogatrion, leaving the model open to criticism regarding its validity. In order to address such potential for criticism the first part of this paper will critically comment on the five factors and the construction of the DM capability levels on the basis of a literature review. This critical analysis focuses on the suitability of the model as a method to assess current DM practices of European businesses.

The second part of this paper will concentrate on the practical application of the Design Management Staircase model to datasets derived from the Design Management Europe (DME) Award. The DME Award originates from the ADMIRE programme and is bestowed for excellence in DM practice, honouring the DM structures of businesses rather than a designed output. The DME Award adopted the Design Management Staircase questionnaire as part of its entry procedure. Altogether the DME Award gathered 321 completed questionnaires from 2008-2011. This provides a unique opportunity to apply the Staircase model to four different datasets obtained from the questionnaires and to analyse the DM capabilities amongst European businesses. Particular attention will be given to the trend of the DM capabilities of European businesses reflected in the Staircase scores between 2008-2011. This includes an analysis of the performance of businesses recognizing design and DM as an important tool for innovation.

In summary, this paper draws upon the following approaches:

- Presenting the Design Management Staircase Model and its development
- Critical investigation of the Design Management Staircase Model and its five underlying factors based on a literature review
- Application of the Staircase Model to the DME Award datasets of European business gathered from the years 2008-2011
- Analysing the trend of the DM capabilities of European businesses reflected in the Staircase scores between 2008-2011
- Analysing the performance of businesses recognizing design and DM as an important tool for innovation reflected in the Staircase scores

DESIGN MANAGEMENT STAIRCASE MODEL

STAIRCASE LEVELS

Kootstra (2009) describes the structure of the Design Management Staircase Model. He states that the Design Management Staircase model is based on a method comparable to the Design ladder (Ramlau & Melander, 2004) of the Danish Design Centre. The Design Management Staircase model describes the characteristic DM behaviour and capability of businesses at four levels. The level classification ranges from the lowest level "No DM" to the highest level where DM is used strategically and is part of the business culture (Figure 1). This ranking implies that businesses reaching higher levels of the model assign a higher strategic use of design than businesses in lower levels. However, businesses do not necessarily have to strive for the highest level, as various external factors determine the particular needs of each business and the most sufficient level of the Design Management Staircase model (Kootstra, 2009).

The four levels are presented as:

- Level 1: No Design Management
- Level 2: DM as a Project
- Level 3: DM as a Function

- Level 4: DM as a Culture

LEVEL 1: NO DESIGN MANAGEMENT

In this level businesses make no use of DM. Design has no role in the business objectives and is only applied occasionally with no or limited objectives. All design results are highly unpredictable and inconsistent due to a lack of a clear defined process. Design knowledge and experience is accordingly absent or very limited.

LEVEL 2: DESIGN MANAGEMENT AS A PROJECT

In this level is the use of design still very limited to meeting direct business needs. Design is not recognised as a tool for innovation or implemented in the New Product Development (NPD) process. Therefore, the use of design is restricted to adding value to existing products through styling, packaging etc. and is only used as a marketing tool with minimal coordination. The responsibility of design remains at an operational level.

LEVEL 3: DESIGN MANAGEMENT AS A FUNCTION

In this level businesses start to recognise design as a tool for innovation. Design is integrated in the NPD process and several disciplines and specialists become involved in the design process. The formal responsibility for design lies with an assigned staff member or department managing all involved groups.

LEVEL 4: DESIGN MANAGEMENT AS A CULTURE

In this level businesses are highly design driven and potentially established market leaders through design driven innovations. Design is an essential part of their differentiation strategy, generating a distinct competitive advantage. For this reason, design is an integral part of the business processes with the involvement of a wide range of different departments. A design literate top management is reinforcing the support and significant value of design amongst the entire business. This results in design being a part of the businesses’ corporate culture.

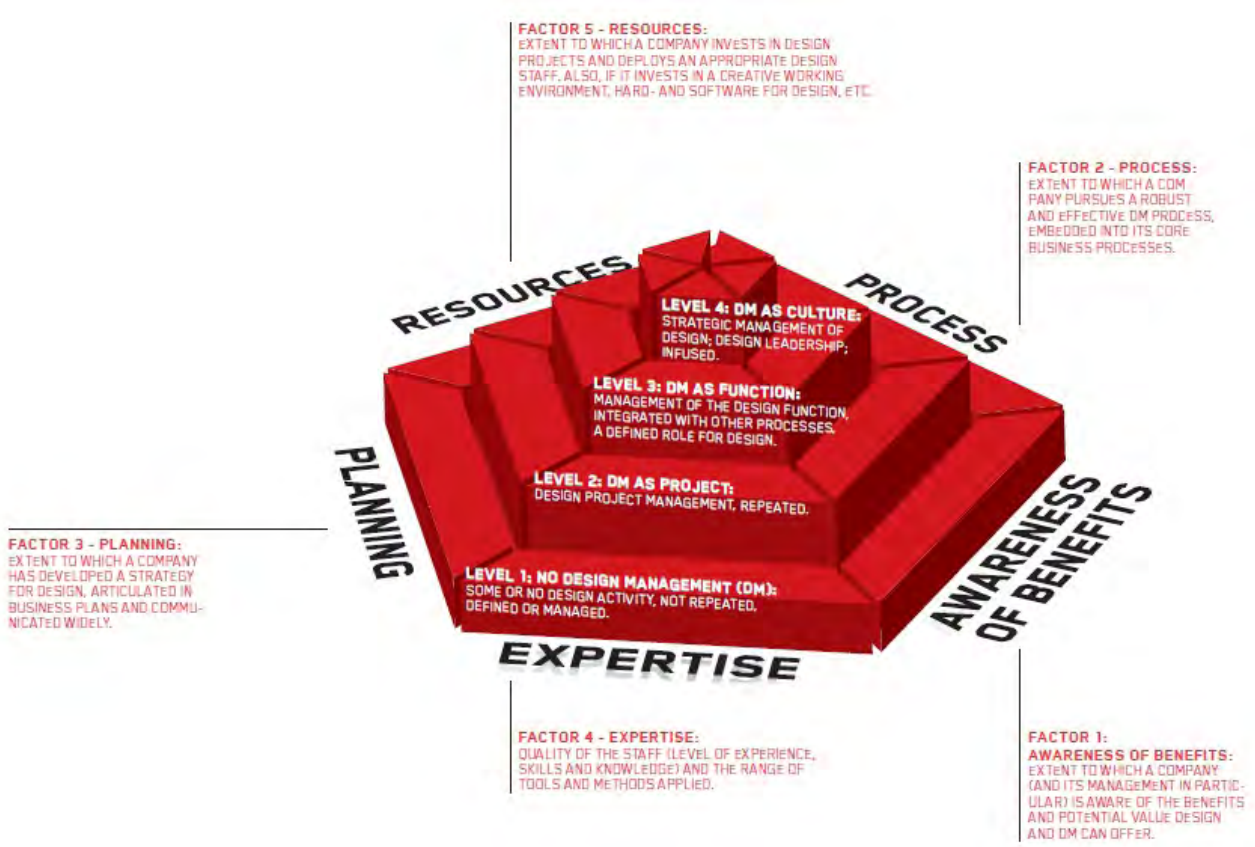


Figure 1 Design Management Staircase model
Source: Design Management Europe Award (2011)

STAIRCASE MODEL FACTORS

All four levels of the Design Management Staircase model are further defined by five factors influencing the success or failure of design and indicating good DM (Figure 2). The level ranking is dependent on the extent to which businesses have implemented these five factors.

The five factors are presented as:

1. Factor Awareness: degree of awareness of benefits
   - The extent to which businesses are aware of the benefits and the potential value that design and DM can offer
2. Factor Planning: whether design plans and objectives are developed
   - The extent to which businesses have developed a strategy for design, articulated in business plans, and communicated widely
3. Factor Resources: people (design staff), funding (budgets) and means of production (facilities)
   - The extent to which businesses invest in design. Resources are considered as the sum of all design investment
4. Factor Expertise: the level of DM experience, skills and expertise
   - The quality of the design staff and the range of tools and methods applied
5. Factor Process: whether an effective process is followed
   - The extent to which businesses follow a professional and effective design management process, embedded in core business processes

FACTORS	DESIGN MANAGEMENT CAPABILITY LEVELS			
	LEVEL 1: NO DM	LEVEL 2: DM AS PROJECT	LEVEL 3: DM AS FUNCTION	LEVEL 4: DM AS CULTURE
AWARENESS (OF BENEFITS)	Not aware of benefits and potential value of design (unconsious use or no use)	Some functional specialists are aware	Most are aware that it is important to remain competitive	All are aware that it is fundamentally important to gain a leadership position
DM PROCESS	No idea where design fits within current processes	Performed inconsistently and late in development process; not repeatable across projects	Performed consistently and early; formal DM process drives performance	Ongoing activity: business is engaged in continuously improving DM process
PLANNING	Company / marketing plans do not mention the use of design	Limited plans and objectives exist at the individual project level	Plans and objectives exist which set direction and integrate design in various activities	Design is part of strategic plans; design planning is a dynamic process that drives the business
DM EXPERTISE	Little or no skills to handle design activity; no DM tools applied	Some skills; basic DM tools applied inconsistently; lots of room for improvement	Standard DM tools applied consistently; some room for improvement	Appropriate expertise; use of advanced DM tools; appropriate metrics used
DESIGN RESOURCES	The business has not committed resources to design activity (may not appreciate the potential return of design investment)	Limited resources are allocated for individual projects; one-off design investments with no review of potential returns	Sufficient resources are allocated on the basis of potential return, but with limited procedures in place to assist in decision making	Substantial resources are allocated, with financial procedures in place to assist in appraising investments, assessing risk and tracking returns

Figure 2 Design Management Staircase model maturity grid
Source: Kootstra, Gert. (2009)

LITERATURE REVIEW

MATURITY GRID

As described above the Design Management Staircase model framework is based on a process maturity model. Each level of the model builds on the previous level. It suggests that each business can undergo a development process to reach the subsequent level. A wide range of maturity and growth models can be found in the literature (Crosby, 1979; Greiner, 1998; Nolan & Gibson, 1974). These models commonly classify development in different stages. Each of the stages has its own challenges to overcome and reaching the subsequent level results in better control. However, it is not essential for businesses to attempt to reach the highest level but rather to settle with the best fit for their specific needs(Nolan & Gibson, 1974).

THE DESIGN MANAGEMENT STAIRCASE MODEL

The Design Management Staircase model was developed to address the lack of knowledge concerning the way businesses in Europe manage design. The main research question was formulated by Kootstra as (2009: 16): ‘How do European SMEs manage design in practice, and how can they further develop their (design management) skills to increase the effectiveness of their design activities?’

Various studies have shown that design has a positive contribution to business performance. For example, Kotler and Rath (1984) argued that design can create a distinct competitive advantage

for businesses, and, Gemser and Leenders (2000) analysed how industrial design affects the performance of businesses. Despite finding evidence for a general positive effect of industrial design on performance, it was found that this impact is unconditionally positive. In fact, the impact of industrial design depends largely on the industry and in particular on the strategy by which industrial design is integrated into the NPD process. Similarly, Hertenstein, Platt and Veryzer (2005) were able to show that good industrial design which enhances the value, utility and appearance of a product improves the performance of businesses in a range of metrics. Industrial design is hereby understood as a process in liaison with multiple departments and stakeholders. The emphasis is clearly that industrial design has to be seen as a design process. Alike Kotler and Rath (1984) argued that design is an active planning and decision making process resulting in a finished product. This design process is seen as a part of the NPD process with the involvement of designers from early stages such as idea generation onwards. Although the design process is closely related to the NPD process there is a clear difference between the two. The design process can be applied to all types of creative activities and focuses on the generation, evaluation and implementation of solutions. It forms the set of technical activities within the NPD process to meet marketing and business aims (Moultrie, Clarkson, & Probert, 2006; Moultrie, Clarkson, & Probert, 2007). Giving designers a more fundamental role can enhance the entire NPD process, creating a more synergistic versus individualistic environment. However, once a part of this process, it will also be necessary to implement management skills such as motivation and persuasion, relationship management and negotiation and the ability to effectively market a product (Perks, Cooper, & Jones, 2005). This highlights the importance of management at any level. The article of Ahire and Dreyfus (2000) showed that managing the design process has a positive input on product design performance and process quality management. It appears that good design emerges as a result of well managed processes, such as a development process that embeds organisational activities, practices and skills. Such a managed process might be considered as DM. This view is supported by Chiva and Alegre (2009) in their assessment of the effect of design investment on business performance and how this effect is mediated by DM. It was revealed that DM improves business performance and that design investment is positively related to DM. However, it is emphasized that purely investing in design does not consequentially lead to improved business performance but rather a well managed and effective process.

According to Borja de Mozota (2003: 70) DM has two objectives: ‘1) To train partners/ managers and designers; 2) To develop methods of integrating design into the corporate environment.’ According to Peter Gorb (cited in Mozota, 2003) DM primarily concentrates on allocating all available design resources to businesses to achieve their strategic objectives. This discipline oversees and directs a business’ creativity and manages the business itself in accordance to their design principles. Therefore, DM has got a design educating role by communicating the value of design and integrating it into the business strategy but also a managerial task by allocating necessary resources to design and managing the design process.

The management and foremost integration of design can take place on three different levels in any business, the operational level, the functional level and the strategic level. Design on an operational level is considered as the initial stage towards integrating design, the second level is presented as creating a design function in the business and the strategic level is characterised by the transformation of the business strategy through design. Each of the design integration levels are characterised by eight underlying factors which vary in their specification and execution depending on the levels. (Mozota, 2003) The factors are presented as:

- Strategy (Design strategy)
- Planning (Defining design procedures and briefs)
- Structure (Design process)
- Finances
- Human Resources
- Information (Developing a design understanding in business)

- Communications
- R&D

Possible impacts on the business have been identified in four key areas. Design can act as a facilitator bringing the cost, quality and time to market into rough parity with competitors; as a differentiator making products more attractive, distinctive, relevant and easier to use; as an integrator implementing design effectively with other functions and as a communicator articulating businesses’ personality, purpose, and standards to internal and external audiences. However, the impact of design on these four key areas is largely dependant on the style of managing design, the employment of the right expertise and the allocation of the right resources (Hayes, 1990).

Further influential factors for the effective management of the design process have been uncovered. Especially, a set of five skills have been found being essential to the design process. These are on one hand the general ability to manage the activities within the design process. This can be on a very basic level as in managing the design process to produce high quality products but also the ability to manage specialised activities such as the ability to assess manufacturability. Further, essential skills are the ability to involve different stakeholders such as customers and suppliers in the design process. Closely related is the ability to manage change, which can refer to general organisational change but as well to the ability to manage cross-functional teams. Foremost, is the ability to manage innovation. This skill is closely related to cultural factors and especially awareness, as it involves the establishment of a creative environment, raising the awareness and generating ideas for innovation (Dickson, Schneier, Lawrence, & Hytry, 1995). Montana, Guzman and Moll (2007) describe in their brand design management model how creating a design management culture is crucial to unleash the full potential of design. A key point in creating a design culture is a strong involvement of the top management to manage the design process efficiently. Awareness and understanding of the potential of design is hereby a vital precondition. Four further activities have been identified as important DM factors, namely concept generation, design strategy, resource allocation and implementation. Olson, Slater and Cooper (2000) developed a process approach for managing design. The first step in the process is raising the awareness by articulating the business objectives and strategies amongst the entire business. The second step involves the understanding of the design requirements but foremost identifying what skills, resources and financial requirements will have to be allocated to the design process. The third step is mainly concerned with ensuring good communications between different involved departments. The fourth step consists of finalising a detailed design brief including taking into account the business strategy, design specifications and positioning against rival products. The final step is the measurement of design performance. This can include both the evaluation of the output product and the evaluation of the design process itself.

Several attempts have been made to classify design activities and capabilities. The Design Ladder presented by Ramlau and Melander (2004) and in the report of the Danish Design Centre (2003) developed a framework to assess the degree of design activity implemented by businesses. The ladder categorises the design activities into four different levels. An important finding of the framework was that the performance of businesses improves relative to their ranking on the Design Ladder. However, the model fails to explain the criteria for placing businesses on the ladder.

The levels are presented as:

- No use of design. In these businesses, design is a hidden aspect of product development. It is generally the task of non design disciplines to develop the functionality and aesthetics of a product.
- Design as styling. Design is seen as the final styling of a product. The task may or may not be undertaken by professional designers.
- Design as process. Design is not an end result, but rather a work method adopted at an early stage of product development and requiring the involvement of several different disciplines, including design.

- Design as strategy. Design has been adopted as a central aspect of the company's business base, used as a means of encouraging innovation, for instance (Ramlau & Melander, 2004: 50).

The Design Atlas was developed to assess business capabilities and the contribution of design (Summers, 2000). It assesses businesses in five key design areas. These are planning, process, resources, skills and design culture. These five factors are assessed on the basis of 15 underlying questions. Depending on the answers given businesses can score between one to four points for each answer, while one is the lowest score and four the highest (Inns, 2002).

Moultrie and Fraser (2004) contributed the Design Process Audit model. This design audit is based on process maturity principles where design performance is classified into four levels. Each level is further defined by five factors. These factors respond to 24 key design activities in which businesses can achieve scores from one to four according to the levels. Maturity is defined as (Moultrie & Fraser, 2004: 34): 'The degree to which processes and activities are executed following 'good practice' principles and are defined, managed and repeatable.' The maturity levels are defined as:

Table 1 Design process maturity model
Source: Moultrie and Fraser (2004)

Factors	Level 1: Not performed or ad hoc	Level 2: Partially performed	Level 3: Formally performed	Level 4: Culturally embedded
Degree of awareness of benefits	Not aware of the benefits	Some are aware of the benefits	All are aware of the benefits	Fundamentally important to success
The people involved	Individual heroics	Functional specialists	X-functional or core team involvement	Extended team including external specialist
The timing of the activity	Typically not performed	Performed inconsistently or late	Performed consistently and early	Ongoing activity
Whether an effective process is followed	No process	Partial process-not repeatable across projects	Formal process drives performance	Continuously improving process
The level of expertise	Little or no expertise No tools applied	Some skills Basic tools applied inconsistently Lots of room for improvement	Standard tools applied consistently Not ingrained across the business Some room for improvement	Use of advanced tools and methods Culturally embedded Appropriate metrics used

METHODOLOGY

APPLICATION OF THE STAIRCASE MODEL

THE DATA

The data is derived from the DME Award entry questionnaires from 2008, 2009, 2010 and 2011. The DME Award entry questionnaire is largely identical to the original Design Management Staircase model questionnaire and features the same questions which underlie the calculation of the Staircase scores. This data relates to the DM practices employed by the entrants, their economic performance and business details. The DME Award received 153 completed questionnaires in 2008, 64 in 2009, 60 in 2010 and 44 in 2011. Though the questionnaire sets of 2008 and 2009/10/11 do not feature identical questions, the questionnaire structure and the questions for the calculation of the Design Management Staircase scores remain largely the same. The questionnaires from all four years give data that can be broken down into four subcategories. These subcategories are:

1. Business data (e.g. business size, employee count)
2. Financial data (e.g. turnover, investments)
3. Design approach (e.g. selection for design, use of design)

4. Self-assessment (e.g. affects of DM on performance, customer satisfaction)

CALCULATION OF THE DESIGN MANAGEMENT STAIRCASE SCORES

For the calculation of the total Staircase score and for the scores of each of the five underlying factors, numbers are assigned to each question. All five factors are calculated as the weighted average of these numbers. The total Staircase is subsequently derived from the average of the five factor scores.

DATA SAMPLE

Businesses were grouped following standard set in the DME Award entry guidelines (Figure 3) :

Micro Companies (1-9 employees)
Small Companies (10-49 employees)
Medium Companies (50-249 employees)
Large Companies (250+ employees)
Non-Profit Organisations (NPO)

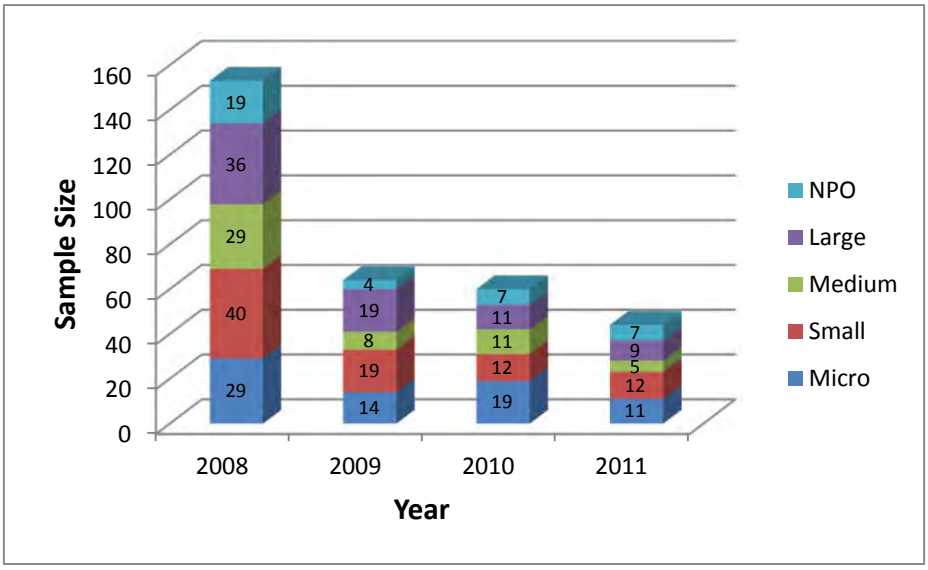


Figure 3 Sample size according to business groups for 2008-2011

DM CAPABILITY TRENDS

The average score for all Staircase categories was calculated for each year and is presented in Figure 5.

DM AS A TOOL FOR INNOVATION

Businesses were grouped following their recognition of design as a tool for innovation (Figure 4).

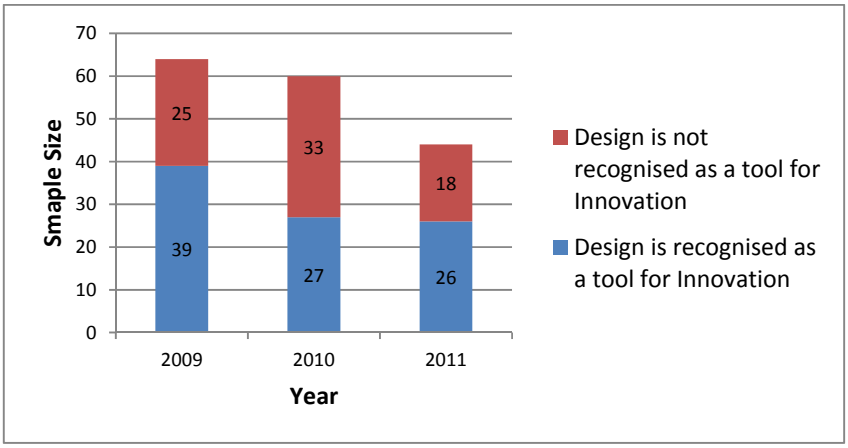


Figure 4 Sample size according to businesses recognising innovation as a tool for innovation for 2009-2011

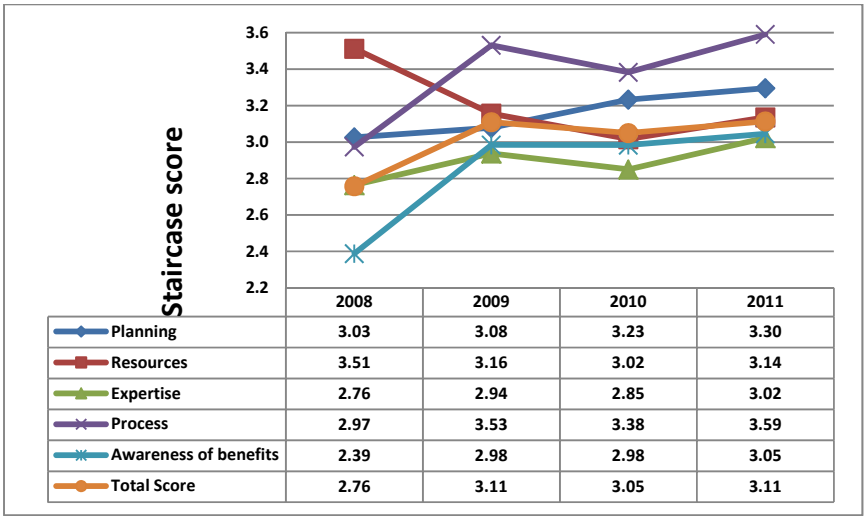
Non-parametric tests were used since all datasets did not show a normal distribution. All significance levels were set at α=0.05.

Datasets for 2009-2011 included additional information regarding businesses' recognition of design and DM as important tools for innovation The Mann-Whitney test was used to compare the scores of each staircase category for businesses that did or did not recognise design as an important tool for innovation for each year (Table 2, 6, 7, 8, 9).

RESULTS

STAIRCASE SCORES CATEGORY TRENDS 2008-2011

All category scores, except for resources, show a general positive trend over the four year period. The resources scores show a negative trend, scoring highly in 2008 then declining until 2010 with a slight recovery in 2011. Despite this negative trend, the scores still remain high overall. Furthermore, the scores for process and planning are higher than the other factor scores overall throughout the 4 year period (Figure 5).



	2008	2009	2010	2011
Planning	3.03	3.08	3.23	3.30
Resources	3.51	3.16	3.02	3.14
Expertise	2.76	2.94	2.85	3.02
Process	2.97	3.53	3.38	3.59
Awareness of benefits	2.39	2.98	2.98	3.05
Total Score	2.76	3.11	3.05	3.11

Figure 5 Development of Staircase scores 2008-2011

RECOGNITION OF DESIGN AS AN IMPORTANT TOOL FOR INNOVATION 2009-2011

A comparison was made between the scores of companies that indicated a recognition of design as a tool for innovation, and those that did not. Across these two groups there were significant differences across the factors resources, process and planning in 2009 and for the factor awareness in 2010 (see Table 2).

Table 2 Independent Samples Mann-Whitney test

Staircase factor	2009		2010		2011	
	Significant differences between businesses recognising design as an important tool for innovation or not	P-Value	Significant differences between businesses recognising design as an important tool for innovation or not	P-Value	Significant differences between businesses recognising design as an important tool for innovation or not	P-Value
Resources	Yes	0.038	No	0.526	No	0.533
Process	Yes	0.001	No	0.235	No	0.084
Planning	Yes	0.035	No	0.807	No	0.648
Awareness	No	0.196	Yes	0.040	No	0.327
Expertise	No	0.212	No	0.620	No	0.051

The frequencies for the factors with significant differences between the two groups for 2009/2010 are presented in the Figure 6, Figure 7, Figure 8, Figure 9.

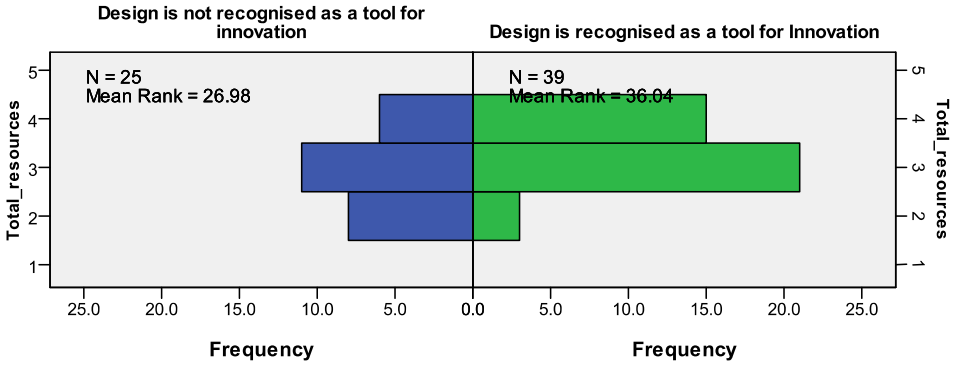


Figure 6 Innovation frequencies for resources 2009

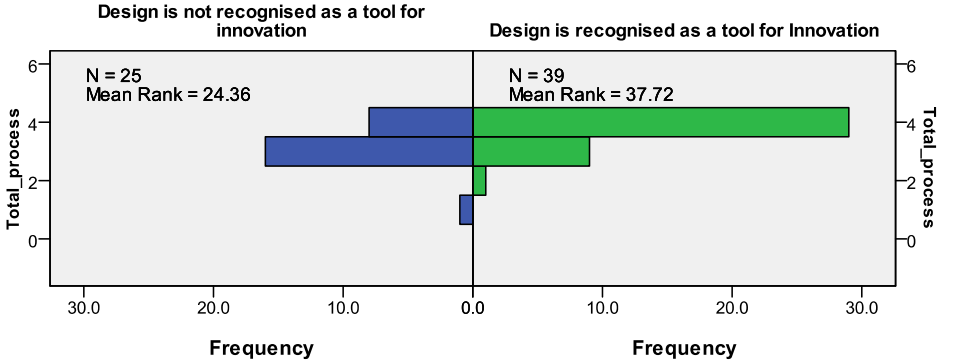


Figure 7 Innovation frequencies for process 2009

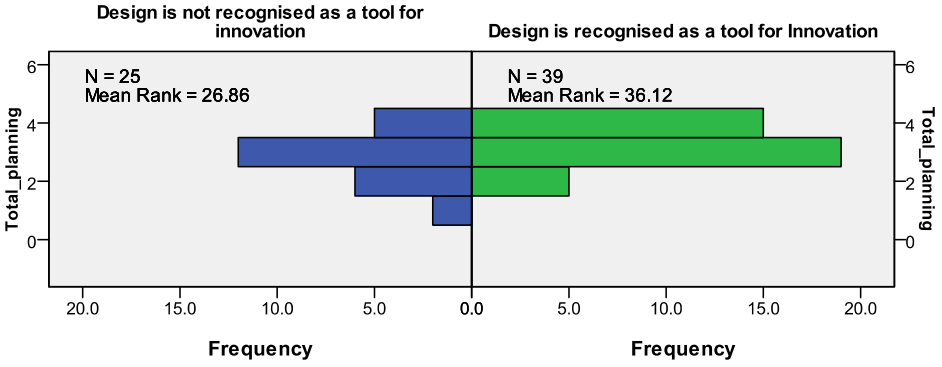


Figure 8 Innovation frequencies for planning 2009

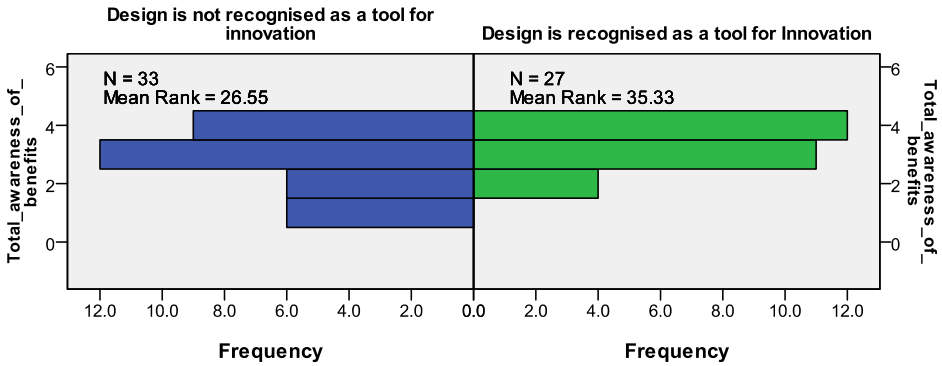


Figure 9 Innovation frequencies for awareness 2010

DISCUSSION AND CONCLUSIONS

To describe and classify DM capabilities a process perspective was chosen for the Design Management Staircase model. Design has been described as a process of active planning and decision making, resulting in a finished product (Hertenstein et al., 2005; Kotler & Rath, 1984; Olson et al., 2000). Therefore, it seems logical to choose a process perspective to classify DM capabilities, especially as recognition of the need for managing this design process emerged into the concept of DM. Further, the choice of a maturity grid implies taking on the process perspective following the definition of Moultrie and Fraser (2004: 34): 'The degree to which processes and activities are executed following 'good practice' principles and are defined, managed and repeatable.'

The structure of the levels of the Design Management Staircase model follow the Design Ladder (Kootstra, 2009). Both rely on classifications in four levels. All four levels are congruent with each other, only differing in classifying design versus DM. However, the Staircase model does not suggest that to be effective in managing design a businesses must strive for the highest level. An essential implication of the Design Ladder on the contrary is that only businesses that reach the highest level will benefiting from the full potential of design (Ramlau & Melander, 2004). Further, it remains unclear how businesses are placed on the Design Ladder and especially how they can achieve the next highest level. The Design Process Audit developed by Moultrie and Fraser (2004) provides more insight in this area. Similarly to the Design Ladder and the Staircase model, it classifies the design process into four levels. It presents a working model to assess businesses' current performance state. In principle, businesses can work out how to achieve a ranking in the highest level. However, it is pointed out that not every business has to strive for the highest level, rather the challenge is to be at the right level for the particular needs for the specific business, as is the case for the Staircase model. Further similarities between the two models become apparent concerning the supplementary structure of the model and its content. Like the Staircase model, all four levels in the Design Process Audit are further defined by five factors. Three of these factors are concordant with the Staircase model factors. These are: degree of awareness of benefits; whether an effective process is followed; and, the level of expertise. There are also obvious similarities regarding the definitions of the three factors on the different levels. Further, all factors in the Design Process Audit are determined by questions regarding 24 key design areas. Possible answer options are ranked from one to four corresponding to the four levels of the Design process audit. Although the calculation of the Staircase model scores is slightly more complex, the principle remains the same. The same applies to the Design Atlas (Inns, 2002; Summers, 2000). The Design Atlas is also used as a working model to assess weaknesses and strengths in the design process. Comparable to the Design process audit and the Staircase model it assesses the design process based on five factors. Each factor is based on a set of questions in which businesses can score between one and four. Again, three of the five factors are concordant with Staircase model factors. The concordant factors are: planning for design; process for design; and, resources for design. The fourth factor of the Design Atlas is called 'People for design' and is concordant with the factor 'expertise' of the Staircase model as it explores the skill sets for the design process. The fifth factor 'Culture for design' is similar to the Staircase factor 'awareness'.

A wide range of important and influential factors for design and DM were described and are reflected in the Staircase model (Dickson et al., 1995; Hayes, 1990; Montana et al., 2007; Mozota, 2003; Olson et al., 2000). The chosen level structure of the Staircase model is widely recognised, for example Mozota (2003) describes operational, functional and strategic levels. Other factors such as strategy are not reflected in the Staircase model, or are only described as part of other factors such as planning. However, the Staircase model aims to assess the DM capabilities of businesses and not the quality or appropriateness of the DM in place, which might explain the lack of consideration of outstanding factors like strategy. Nevertheless, it can be concluded that the Staircase model largely arose out of a combination of the Design Ladder, the Design Process Audit and the Design Atlas, as it follows fundamentally the same principles, structures and factors. The

main differences lie in the aims of the different models. Whilst the Design Ladder, the Design Process Audit and the Design Atlas each assess design, the Staircase model examines the design process, and as a result makes a judgement on the management of design. It is arguable that assessing the design process and assessing the capabilities to manage the design process cover the same areas. However, in order to come to a final conclusion it will be necessary to analyse the Staircase model questionnaire in order to determine if the questions aim to obtain insights on businesses’ mechanisms for managing the design process. The Staircase model itself does not reveal sufficient information concerning this matter.

Kootstra (2009) claims that design driven businesses are better innovators than other businesses. Various studies have demonstrated that design can be the major force for innovation, influencing innovation on different levels (e.g. Montana et al., 2007; Perks et al., 2005). But only as a well managed process can design unleash its full potential and enable businesses to use design for innovation (Knošková, 2011). Following this argument, the Staircase level classification states that only at level three and four do businesses start to recognise design as a tool for innovation. Therefore, it would be reasonable to conclude that all businesses that recognise design as a tool for innovation would obtain level three or four, and conversely all other businesses would be limited to levels one and two. Within the available data set there are similar numbers of companies that have both indicated that they do indeed recognise design as a tool for innovation, and those that do not (Figure 4). The analyses with the Mann-Whitney test, comparing the scores of each Staircase factor for businesses that did or did not recognise design as an important tool for innovation, revealed significant differences in the scores for 2009 in the factors resources, process and planning. In 2010 a significant difference uncovered for the factor awareness (Table 2). Possible explanations for these differences lie in the nature of the Staircase model, that is, as it is built on a process perspective certain factors influence other factors. In this particular case it is arguable that a changed perception about design as a tool for innovation changes also the allocation of resources to the design process, the design process itself and the planning process. Similarly, an especially a high level of awareness might lead to the recognition of design as a tool for innovation; Mozota (2003) argued that awareness stimulates innovation. Businesses which recognise design as a tool for innovation score significantly higher than the businesses which do not (Figure 6, Figure 7, Figure 8 and Figure 9). However, the analyses of the interdependencies of the different factors go beyond the scope of this paper and will be addressed in future research. A possible explanation for the lack of significant differences in the other factors, and for all factors in 2010 may centre on an improved selection of businesses for the DME Award in combination with the instruction of the Staircase model that businesses do not have to strive for the highest level. Over time it appears that entrance to the award has become more selective. This is reflected in Figure 3 which illustrates the declining number of participants but also in Figure 5 showing the positive trend in the Staircase scores. A combination of both factors may lead to a greater proportion of entrants having good DM at lower Staircase levels, who still recognise design as a tool for innovation. However, it is indicative of a problem with the Staircase model if the instruction is that one does not need to achieve a high level (only an appropriate one), yet recognition of design as a tool for innovation is a pre-requisite for achievement of the higher levels. Further, it is possible (and demonstrated in the results) to achieve these high levels even if a company indicates that it does not recognise design as a tool for innovation, as the overall score is generated from a simple average across all responses.

LIMITATIONS

It is the nature of models such as the Design Management Staircase that there will always exist a wide range of limitations. The reasons for this are twofold: there is a limited extent to which a model can consider all of the influential factors for each business; and, models are always limited by the current state of research. A further limitation is the data gathering. The answers to the questionnaire that underpins the Staircase scores are largely dependant on the individual’s perception. This makes comparison between businesses and the classification in the model itself

subjective. Further still, as the questionnaire is linked to a competition, then organisations might bias their self-reporting in an attempt to win an award. In addition, the data sets contain different businesses each year, so there is no potential for examination of business progression over time.

FURTHER RESEARCH

Understanding how the Design Management Staircase model was developed, and what it is based on, is a first step to understanding the potential of the Staircase model in assessing DM capabilities. As a result, this investigation has produced information that can be used to build upon and improve the Staircase model to create a tool that is useful to business and academics in the assessment of DM capabilities. As an immediate action, the authors intend to examine the questionnaire which is used to calculate the Staircase scores. This step will be necessary to analyse how appropriate is the choice of the questions for the provision of insights into the five factors. Further, it would be interesting to analyse the interdependencies of the five factors, in order to gain further insights into which of the factors are the most important or have influence over the others, and, to examine how the scoring reflects the stated criteria for each level. In addition, investigating how business categories differ from each other within the different factors will offer valuable insights into which type of business has the greatest DM capabilities or potential. This will also address one of the limitations of this paper, by examining the influence of the position of the individual on capability level, thus paving the way to establishing the Staircase model as a valuable tool for assessing DM capabilities.

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Leigh, K. E., Huber, A. M., & Tremblay, K. R. (2012). *Can Creativity Make a Difference? Leveraging the Creative Work Environment to Impact Performance In Annual Revenues of Architectural Firms.*

CAN CREATIVITY MAKE A DIFFERENCE? LEVERAGING THE CREATIVE WORK ENVIRONMENT TO IMPACT PERFORMANCE IN ANNUAL REVENUES OF ARCHITECTURAL FIRMS

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Creativity remains an elusive, intangible contributor to workplace performance despite emphases from psychoeconomic approaches. Few empirical studies investigate creativity's influence on organizational performance in a manner applied to practice or have differentiated creative versus non-creative domains (Ensor, Pirrie, & Band, 2006). Florida and Goodnight (2005) also propose organizations have yet to establish management frameworks maximizing their creative capital. This study examines responses to an e-survey from staff of five top ranked U.S. architectural practices (*N* = 90). Study findings identify potential differences between creative versus non-creative domains, factors impacting creativity in the workplace, and the relationship between organizational creativity and annual revenues. Based on study findings, the Firm Creativity Profile (FCP) directs practitioners' attention to specific factors important in leveraging organizational creativity impacting performance.

Keywords: Organizational creativity; performance; values

ORGANIZATIONAL CREATIVITY

Attention to creativity has experienced spurts of activity after post-war years as the U. S. focused on expanding and accelerating its role as a world leader and as pace of change in the economy has accelerated. Basadur and Gelade (2006:45) suggested organizations need to improve performance to capitalize on rapid change in order to establish or regain competitive edge. "Creativity in synthesizing complex information becomes more essential as rapidly changing organizational life requires individuals to tolerate ambiguity, instead of perpetuating conservative decision-making" (Krantz, as cited in Williams & Yang, 1999:377). Since Guilford's acceptance speech to the American Psychological Association in 1950, creativity research has moved from a focus on individual views of creativity encompassing measurement of personality factors as a psychometric approach (Guilford, 1956; Torrance, 1988; MacKinnon, 1962) to a systems view of creativity emphasizing the interaction of the individual with the environment (Gruber, 1988; Csikszentmihalyi, 1988; Gardner, 1988, 1994). More recently, creativity has embraced cognitive views of creativity examining thinking processes (Amabile, 1988; Aspelund, 2010; Poldma, 2009) and the value of creative performance from an economic perspective (Cohen & Levinthal, 1990; Rubenson & Runco, 1992; Sternberg & Lubart, 1992).

Organizational levels of creativity (Amabile, 1988; Collins & Amabile, 1999) have been examined focusing on influences of climate factors in the work environment (Amabile & CCL; 1987, 2009;

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Hunter, Bedell, & Mumford, 2007)) to confirm the extent and consistency of factors contributing to creativity in non-design organizations. These studies are not without contradiction to their findings. Factor relationships have been challenged, for example, in instrumentation structure of Amabile's KEYS (Baer & Oldham, 2006; Ensor, Pirrie, & Band, 2006; Rosenberg, 2007). Construct comprehension and clarity surrounding time pressures and freedom have been questioned; in addition, work processes have been significantly influenced by new technologies, information networks, and the presence of a multigenerational workforce. And, a single definition of creativity has not been universally adopted by the researcher community, differing by researcher, discipline orientation, and time frame (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Cowdroy & DeGraf, 2005, Rhodes, 1987).

Williams and Yang (1999:389) examined the concept of *organizational creativity* as an adaptive entity "highlight[ing] the need for…[greater] employee autonomy, intrinsic motivation and commitment," not just individual creativity in a group work setting. Studying creativity within complex social settings, group creativity has been depicted as a function of an individual's group, influenced by group composition (diversity), group characteristics (cohesiveness, size), group processes (problem-solving strategies, social information processing), and contextual influences stemming from the organization (Woodman, Sawyer, & Griffin, 1993). The creative organization encompasses factors surrounding removal of barriers demonstrating managed innovation, idea evaluation procedures, motivational stimuli, communication procedures, development of idea sources, and evidence of the creative planning process (Majaro, 1991). By examining group creativity on an organizational level, individual idiosyncrasies are eliminated and the focus is directed toward factors affecting the group as a whole; useful when examining organizational characteristics such as performance.

Research studies rooted in psychoeconomic theory (Cohen & Levinthal, 1990; Lubart & Sternberg, 1996; Rubenson & Runco, 1992; Zahra & George, 2002) have shown conceptual promise in terms of economic performance measures related to creativity (Runco, 2004); however, research in this area has not generated information useful to practitioners. While creativity continues to serve as a mantra for organizations competing in the global economy, Florida and Goodnight (2005:125) proposed:

> …businesses have been unable to pull …notions of creativity together into a coherent management framework" despite their assertion that "a company's most important asset isn't raw materials, transportation systems, or political influence…it's creative capital - an arsenal of creative thinkers whose ideas can be turned into valuable products and services.

PURPOSE OF THE STUDY

An indirect relationship between business excellence (performance) and organizational innovation (organizational creativity) was indicated in the findings of a study by Eskildsen, Dahlgaard, and Nørgaard (1999) suggesting organizational creativity's inability to directly impact organizational excellence and mediated by organizational learning. This research examines factors found to be significant in the creativity literature focused on the workplace to examine the relationships between creativity and performance in architectural practice as a creative professional domain. Creativity and innovation characterize the architectural work environment (Birnberg, 1999; Blau, 1984; Cuff, 1991; Pressman, 2006) and the products of architectural services (i.e., generating new and creative ideas through their work; Rhodes, 1987). Does creativity make a difference? Further, as the Architectural Billing Index (ABI) reached historic lows, how can practitioners leverage creativity to maximize performance? A secondary purpose, then, as an outcome of this research, was to investigate and propose the development of tool(s) derived from empirical findings for application by design practitioners and management.

CONCEPTUAL FRAMEWORK

The conceptual framework for the study (Figure 1) initially considered factors reported in the literature to impact organizational creativity; disciplines including the social sciences, human resource development, industrial design, and technology have each examined specific factor structures. Creativity measures developed in this study include individuals' *self-evaluation of creativity* (*Cs*), and composite indices for *creativity as a component of the job or firm function* (*Cf*) and the *creative work environment (CWE*). Values measures focused on individual *job satisfaction* (*Js*), and composite indices constructed for *job interdependence* (*Ji*), *workplace values* (*Wv*) and value discipline models (Treacy & Wiersema; 1995) for *product leadership (PL), customer intimacy (CI)*, and *operational excellence* (*OE)*.

FACTOR SELECTION AND CONSISTENCY

Two consistent and major challenges to factor identification were inconsistent terminology and inconsistency of statistics and validation measures across various studies. Hunter et al.'s (2007) meta-analysis provided one source for contextual comparison of factors comparing effect sizes (Cohen, 1992) using Cohen's delta to calculate each factor's effect size across 42 studies. Factors producing large effect sizes were of central concern in this study's factor selection and confirmed inclusion of the top three factors:

- positive interpersonal exchange (Δ = .91, SE = .39)
- intellectual stimulation (Δ = .88, SE = .18)
- challenge (Δ = .85, SE = .14)

Support for creativity from management, supervisors and peers was also deemed important in varied studies as well as top management support for creativity (Δ = .75, SE = .10).

Factors producing small effect sizes included:

- autonomy (freedom) with the smallest effect size (Δ = .48, SE = .09)
- resources (Δ = .51, SE = .19)
- reward orientation (Δ = .55, SE = .14)

These findings contrasted statistically with Amabile's et al. (1996) findings which suggested *encouragement, autonomy and freedom*, and *resources* promoted creativity (Amabile & CCL, 1987, 2009; Amabile et al., 1996; Bonnardel & Marmarche, 2004; Damanpour, 1991; Drazin, Glynn, & Kazanjian, 1999; Dul & Ceylan, 2011; Ekvall & Ryhammer, 1999; Hunter et al., 2007; Madjar, 2005; Mathisen & Einarsen, 2004; Vithayathawornwong, Danko, & Tolbert, 2003). *Threats or impediments* to creativity (workload pressure, work not perceived to be challenging, and organizational impediments such as rigid or controlling management structures) have been alternately suggested as negating the role and presence of creativity (Amabile et al., 1996). Pressures in organizations may have shifted over the past 10 years, impacting of these factors. Flexibility and risk-taking (Δ = .78) were excluded from this study based on the assumption these factors of the creative work environment would be inherent in the workplaces of creative domains and specifically within the realm of architectural practice.

These findings were considered in the final selection of factors to be included in the study (Figure 1):

- creativity
    - self-evaluation
    - creativity of the job/firm
    - creative work environment
- values
    - job satisfaction
    - job interdependence
    - workplace values

    - value discipline
- performance
    - annual revenue tier

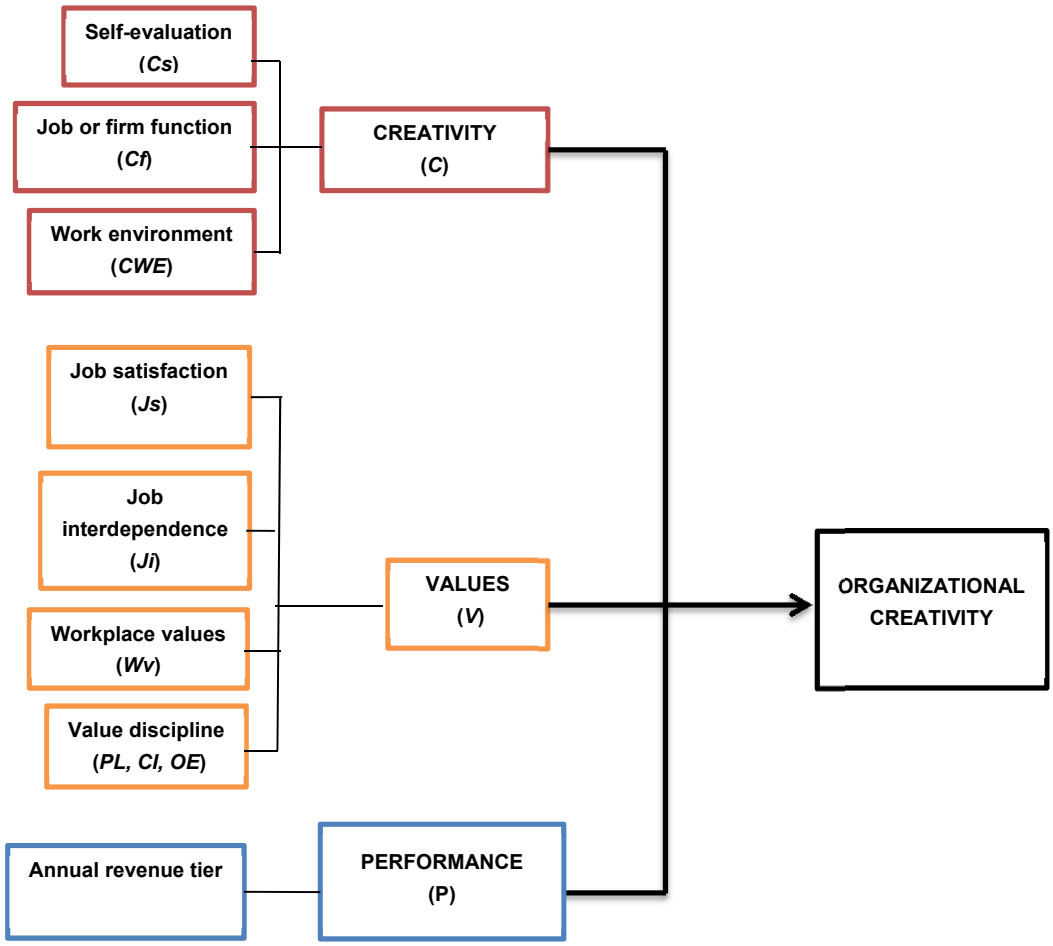

Figure 1 Conceptual framework with key factors related to organizational creativity (Leigh, 2010)

RESEARCH QUESTIONS

The research design was guided by three research questions:

- RQ1: What is organizational creativity in architectural practice?
- RQ2: Is there a relationship between creativity and performance in architectural practice?
- RQ3: How well does a combination of values and performance predict creativity in architectural practice?

METHODOLOGY

Thirty firms were drawn from a stratified random sample of Architectural Record's 2009 Top 250 Firms reporting annual revenues from architectural services only; 109 firms were invited to respond to an e-survey. From the 109 firms, three tiers were constructed with equal distribution of firms in each tier; the architecture revenue ranges were:

- TIER 1: $32.00 TO 549.95 MILLION
- TIER 2: $18.00 TO 32.00 MILLION
- TIER 3: $4.65 to 17.90 MILLION

Although fifteen firms provided an appropriate sampling size, selected based on total potential population using a sampling table (Patten, 2007), the number of firms was doubled when issues in the economy potentially impacting architectural services were considered (i.e.,

the Architectural Billing Index reached record lows). Firms in each tier were treated as a group, representing a variant on cluster sampling. Geographic distribution of the sample was examined and representative of the geographic distribution of the 109 firms from the top 250 list. Consistency in practice focus and work tasks found in large scale urban practice was assumed.

Three firms declined at the beginning of the research, citing economic challenges; eight firms immediately agreed to participate; a 29% response rate. Data were collected from participants of five firms; three firms did not access the survey during the scheduled survey release. The e-survey contained questions about respondent backgrounds and the constructs of creativity, values, and performance. Firm principals served as gatekeepers in distributing the survey access site invitations to staff and were instructed to send two reminders to employees a week apart after the first two weeks.

MEASURES

All data was based on self-report questionnaires provided electronically. The survey included three main sections a) Part 1 included demographic measures; b) Part 2 included ratings of agreement for the three value disciplines (9 items); and c) Part 3 included ratings of agreement for work environment and value factors included in the study (15 items).

SELF-EVALUATION OF CREATIVITY *(CS)*

Self-evaluation of creativity of the respondent was measured on a 3-point scale ranging from extremely, moderately, and a little, with a choice of not at all.

CREATIVITY OF THE JOB/FIRM *(CF)*

A measure for creativity was included in Amabile et al.'s (1996) model within the measures for the creative work environment. This measure was used to represent creativity of the organization and measured using a 5-point Likert scale focused on the extent to which creativity is an integral component of the work, ranging from strongly agree to strongly disagree.

CREATIVE WORK ENVIRONMENT *(CWE)*

Creativity of the work environment was measured by 11 factors including *Cf* with five items each and measured using a 5-point Likert scale, ranging from strongly agrees to strongly disagree:

- Organizational encouragement (*Oe*)
- Intellectual stimulation (*Is*)
- Leader support and feedback (*Ls*)
- Positive interpersonal exchange (*Pi*)
- Sufficient resources (*R*)
- Freedom (*F*)
- Challenging work (*Cw*)
- Workload demands (*Wd*)
- Organizational roadblocks (*Or*)
- Productivity (*P*)
- Creativity (*Cf*)

Measures for *leader support and feedback, positive interpersonal exchange, freedom,* and *workload demands* were adapted from an instrument developed by Haynes, Wall, Bolden, Strike, & Rick (1999) with permission of the authors. Measures for *organizational encouragement, intellectual stimulation, sufficient resources, challenging work, organizational roadblocks, creativity*, and *productivity* were developed by the researcher after review and synthesis of items used in previous research studies (i.e., Amabile et al.,1996; Amabile & Gryskiewicz, 1989; Axtell, Holman, Unsworth, Wall, Waterson, & Harrington, 2000; Damanpour, 1991; Drazin et al., 1999).

JOB SATISFACTION *(JS)*

Job satisfaction of the respondent was measured on a 3-point scale ranging from extremely, moderately, and a little, with a choice of not at all.

JOB INTERDEPENDENCE *(JI)*

A published instrument (Fields, 2002) was adapted with permission for *job interdependence* (Dean & Snell, as cited in Fields, 2002:101-102) and measured with 5 items using a 5-point Likert scale, ranging from strongly agree to strongly disagree.

WORKPLACE VALUES *(WV)*

A published instrument (Fields, 2002) was adapted with permission for *workplace values* (Van Dyne, Graham, & Dienesch, as cited in Fields, 2002:284) and measured with 10 items using a 5-point Likert scale, ranging from strongly agree to strongly disagree.

VALUE DISCIPLINES *(CS)*

Measures for value disciplines (*PL*, *CI* and *OE)* were developed by the author based on an examination and understanding of components of the value discipline characteristics for market leadership outlined by Treacy and Wiersema (1995:52,90,130) to test their relationship to creativity. Three statements were attributed to each value discipline and measured using a 5-point Likert scale, ranging from strongly agree to strongly disagree.

ANALYSIS

From a postpositivistic perspective (Creswell, 2003), the study collected empirical data to expand a theoretical understanding of factor relationships. Exploratory factor analysis (EFA) examined construct integrity and internal reliability in constructing indices (Agresti & Findlay, 1997) and principal axis factor analysis (PA) with varimax rotation assessed underlying factor structures.

Pearson chi-square was calculated to determine statistically significant relationships in evaluating effect size. For *annual revenue tier*, Kendall's tau-b was used to measure strength of the association; if the association was statistically significant $p < .001$, *tau* would be interpreted in a similar manner to *r* as a large effect size. For correlations and regression computations, Pearson product moment (bivariate Pearson) correlation and Spearman *rho* (for ordinal variables) were calculated. In simultaneous multiple regression computations, the adjusted R^2 value was also examined. One-sample *t* tests and independent sample *t* tests were also calculated using the Mann-Whitney U test (nonparametic) test for the latter and calculating the effect size for *d*. Finally, one-way ANOVAS, single factor analysis and MANOVAS, and multi-factor analysis were used to compare groups followed by post hoc Tukey HSD Tests to identify specific differences.

Cronbach's alphas were calculated to examine reliabilities for the summated scores (indices) representing creativity (*Cf*); for each of the items comprising the creative work environment (*CWE*); for workplace values (*Wv)*, job interdependence (*Ji*); and indices for the three value disciplines, *PL, CI*, and *OE*. For a five item Likert scale, alpha ≥ .70 was acceptable (Morgan, Leech, Gloeckner, & Barrett, 2007); for the value discipline indices, slightly lower alphas were acceptable. For published scales where Cronbach's alphas were given, comparison was made with the adapted scale. High correlations from regression models were evaluated and steps taken to eliminate multicollinearity by combining variables or eliminating one or more variables from the regression model.

RESULTS

Three firms participated from Tier 2 and two from Tier 3; firms from Tier 1 did not participate in the study. Respondents encompassed design and non-design positions, typical of larger architectural practices located in urban areas in the west, mid-west and eastern United States. An overwhelming majority identified themselves as creative (92%), and identified annual salaries commensurate with their positions. Twenty-two respondents earned an annual income over $105,000 (26%). The most frequently reported salary range was $45,001-$65,000, similar to the

average salary range reported by the Bureau of Labor Statistics (2009). Two-thirds of respondents were male with females in these firms holding positions approximating percentages reported by the American Institute of Architects for executive levels with increasing percentages of participation as they noted higher positions in the firm, similar to that of male counterparts in same positions. Females exhibited a slightly higher representation as positions advanced to executive levels, atypical of the career path in architecture for women. Over half of participants held architectural degrees with a few holding international architectural credentials (education or professional organizations). More than half of respondents had experience in the corporate/commercial, education, residential, and retail market segments and over 48% had been in practice more than 15 years with nearly 21% in practice over 25 years.

CREATIVITY IN PRACTICE

Three creativity measures were used in the study encompassing a) employee self-reports of how creative they perceived themselves (*Cs)*, b) measures of creativity intended to construct a composite index of job or firm creativity (*Cf*), and c) factors comprising the creative work environment (*CWE*).

SELF-EVALUATION OF CREATIVITY (*CS*)

Participants rated their level of creativity high (*Cs*) with over 92% of design and non-design respondents rating themselves moderately to extremely creative confirming a widely held perception of the creative character of those in this professional domain (M = 1.63; SD = .66 using a 5-point Likert scale). The sample mean was compared to a hypothetical population mean calculating a one-sample *t*-test. When the value was set at 2 (agree), suggesting most architects would consider themselves creative, p = .001, the sample mean (1.63) did not differ from the population mean, suggesting respondents evaluated themselves as more or less equally as creative as their peers in practice. This also suggested statistically participants were not influenced by knowledge of the study's focus on creativity based on statistical similarity to a reasonable population mean.

CREATIVITY OF THE JOB/FIRM (*CF*)

The second measure of creativity examined the extent to which creativity was perceived an integral part of the function of the job or firm. Creativity (*Cf)* was perceived as an integral component of the job or firm. Table 1 shows all pairs of items significantly correlated, with a statistically significant relationship to one another. The mean score for combined items for *Cf* was 2.28 *(SD* = .64; N = 78); and 1.63 (*SD* = .67) when non-design staff (N = 75) were excluded. Cronbach's alpha was computed, with design versus non-design staff combined. An unstandardized alpha of .88 resulted, above the threshold established for reliability ($\alpha \geq .70$) and acceptable for a five item scale.

To examine whether *Cf* differed across firms, means of each firm's *Cf* index were compared calculating one-way ANOVA with no statistical difference found across firms.

Although a relationship might be assumed between how creative respondents considered themselves and the extent to which they perceived creativity as an integral part of their job in the firm, a correlation between self-evaluation of creativity (*Cs*) and creativity of the job/firm (*Cf*) index, was not statistically significant, r_s (76) = .04, p = .697. The lack of correlation between how creative an individual rated oneself and perceptions of creativity as a part of job or firm invited continued inquiry.

Table 1 Intercorrelations, Means, and Standard Deviations for Creativity of the Job/Firm (Cf) Variable (N = 78)

Item	Item 1	Item 2	Item 3	Item 4	Item 5	*M*	*SD*
Item 1: This firm produces innovative projects	--	.70**	.63**	.47**	.60**	2.16	.84
Item 2: Project tasks call for people to be creative	--	--	.69**	.48**	.58**	2.13	.71
Item 3: People are encouraged to be creative in this firm	--	--	--	.58**	.67**	2.02	.70
Item 4: People are encouraged to take risks in this firm	--	--	--	--	.63**	2.73	.83
Item 5: Overall, the current work in this firm is conducive to personal creativity	--	--	--	--	--	2.34	.80

***p* = .001

CREATIVE WORK ENVIRONMENT (*CWE*)

The third measure of creativity assessed the creative work environment using an index of 11 factors (Table 2) similar to and found significant in prior climate studies of work environments (Amabile, 1996; Amabile & CCL, 1987, 2009; Amabile & Gryskiewicz, 1989; Damanpour, 1991; Haynes et al., 1999; Hunter et al., 2007; Majaro, 1991).

REVISED INDICES: *CWER AND CFR*

Principal axis factor analysis (PA) with varimax rotation suggested new combinations of items influencing items used to construct indices. Five indices comprise the revised creative work environment index (*CWEr*) with 28 items.

- Creativity of the job or firm
- Organizational encouragement
- Leadership support and feedback
- Intellectual stimulation
- Challenging work

Cronbach's alpha for the revised composite index was higher than the original index; *CWEr* = .87 compared *α* = .70, demonstrating increased reliability. In Hunter et al.'s (2007) meta-analysis, *positive interpersonal exchange, intellectual stimulation, challenge* and *organizational encouragement* were found to have significant effect sizes and *autonomy, resources* and *reward* small or negligible effect sizes. The changing context of the workplace during an economic crunch may mean in creative work environments such as architectural practice, *freedom, positive interpersonal exchange, workload demand* and *organizational roadblocks* may be conceptualized differently.

The creativity index (*Cfr*) was intended to capture the extent to which creativity was perceived as part of the job function or firm encouraging ideas, debate, and discussion of meaningful and demanding work executed effectively and efficiently. Chronbach's alpha increased from .88 to .92 when all sixteen items were included based upon factor loading during the analysis of *CWE*. Since the increase in Cronbach's alpha was minimal (.04), the decision was made to: a) keep the original intellectual stimulation index (α = .83) and challenging work index (α = .80) intact in subsequent analyses (four items each for intellectual stimulation (*Is*) and challenging work (*Cw)* were incorporated in the factor loading indexing *Cfr)*; b) use each of the five original items for *Cf;* c) include one item each that loaded on the first factor (organizational excellence item 1, and productivity items 1 and 5. The revised creativity of the job or firm (*Cfr*) index included eight items: *C1-5, Oe 1* and *P 1*, *P5* with a resulting Cronbach's alpha of .89.

Table 2 Intercorrelations, Means, and Standard Deviations for Creative Work Environment (CWE) Composite variable (N = 70)

Index	*Oe*	*Is*	*Ls*	*Pi*	*Sr*	*F*	*Cw*	*Wd*	*Or*	*Cf*	*P*	*M*	*SD*
Oe	--	.64**	.58**	.45**	.32**	.20	.48**	-.23	-.61**	.58**	.21	2.56	.69
Is	--	--	.56**	.43**	.38**	.22	.54**	-.20	-.58**	.70**	.31**	2.41	.71
Ls	--	--	--	.41**	.29*	-.08	.43**	-.36**	-.40**	.57**	.21	2.28	.64
Pi	--	--	--	--	.32**	.19	.48**	-.14	-.49**	.42**	.28*	2.32	.36
Sr	--	--	--	--	--	.28*	.45**	-25*	-.38**	.40**	.26*	2.34	.53
F	--	--	--	--	--	--	.25*	.11	-.22	.36**	.09	2.42	.38
Cw	--	--	--	--	--	--	--	.02	-.35**	.67**	.35**	1.97	.53
Wd	--	--	--	--	--	--	--	--	.32**	-.06	-.09	2.47	.47
Or	--	--	--	--	--	--	--	--	--	-.52**	-.06	3.22	.55
Cf	--	--	--	--	--	--	--	--	--	--	.34**	2.23	.65
P	--	--	--	--	--	--	--	--	--	--	--	2.68	.41

** $p < .01$; * $p < .05$

COMBINED CREATIVITY INDEX

Cs, Cfr, and *CWEr* were conceptualized to represent dimensions of creativity in architectural practice, to consider person, process and environment. Cronbach's alpha for a combined index was .54; therefore, a summated index was not deemed reliable.

FIRM DIFFERENCES

An assumption that architectural practices are similarly creative was tested by computing a one-way ANOVA examining variance of means for four[*] firms in the study. A statistically significant difference was found among the firms on creative work environment (*CWEr)*, $F(3, 69) = 2.89$, $p = .042$. The mean value for *CWEr* is 1.97 in firm A, 2.17 in firm B, 2.35 I firm C, and 2.43 in firm D (Table 3).The results of the post hoc Tukey HSD Test indicated firm D differed from firms A, B, and C on *CWEr* ($p < .05$, $d = .87$; with a smaller than typical effect size, $R^2 = .16$ suggesting some firms may reflect more creative work environments than others in practice (Table 4).

VALUE DISCIPLINE

A strong association with product leadership's operating model was anticipated to theoretically the choice of a market leadership discipline (Treacy & Wiersema, 1995:90) valuing creativity and innovation to a greater degree than value disciplines for operational excellence and customer intimacy. *PL* appeared a good fit for respondents identifying with the extent to which creativity is part of the job or firm (*Cfr*). This finding is consistent with a value model embracing innovation as a characteristic of the organization's management system and culture.

ANNUAL REVENUE TIER

Tier 2 participants significantly differed from Tier 3 on years with firm ($p = .005$), in an independent samples *t*-test. Effect size, *d*, was approximately .30 for years with firm, slightly larger than a small effect size. Individuals in Tier 3 had been with their firms longer. On the remaining demographic variables, no significant differences were found by tier.

Embedded in this study was the question of difference by tier across three measures for creativity. The strongest correlation with tier, considered a very large effect, was with *CWEr*, r_s (71) = .85, $p < .001$. ANCOVAs indicated two creativity variables, *CWEr* and *Cfr,* when examined

[*] One firm had only one respondent to the survey.

alone, were significantly different for tier, $F(1, 71) = 5.26$, $p = .025$, and $F(1, 71) = 7.62$, $p = .007$, respectively; with medium to large effect sizes.

The relationship between performance and creativity was examined by analyzing annual revenue tier in relation to the creativity variables. No association was found between tier and creativity self-evaluation (*Cs*); however, participants from Tier 3 scored significantly different on the creativity measures of *Cfr* and *CWEr* than participants in Tier 2 (Table 4), suggesting that Tier 2 respondents rated their perceptions of the work environment and how creative the perceived the job or firm higher; *the more creative the firm, the higher the revenue*.

Table 3 Means and Standard Deviations Comparing Creativity Measures for Four Firms for Creative Work Environment (CWEr) and Predictor Variables (N = 73)

Firms	*Cs*		*Cfr*		*CWEr*	
	M	*SD*	*M*	*SD*	*M*	*SD*
A	1.63	.62	2.29	.57	2.35	.48
B	1.59	.62	2.25	.33	2.17	.27
C	1.74	.72	2.49	.66	2.43	.55
D	1.47	.62	2.03	.51	1.97	.47
Total	1.63	.66	2.33	.59	2.30	.51

Table 4 One-way Analysis of Variance Summary Table Comparing Four Firms on Cs, Cfr, and CWEr

Source	*df*	*SS*	*MS*	*F*	*p*
Cs					
Between groups	4	1.29	.32	.72	.58
Within groups	84	37.47	.44		
Total	88	38.76			
Cfr					
Between groups	3	2.24	.75	2.22	.09
Within groups	71	23.88	.33		
Total	74	26.13			
CWEr					
Between groups	3	2.12	.71	2.89	.04
Within groups	69	16.93	.24		
Total	72	19.06			

PREDICTING PERFORMANCE IN PRACTICE

Multiple regression was conducted to determine the best linear combination of value and creativity measures for predicting performance. Variable transformations were conducted to correct multicollinearity with tolerances low for all variables (with the exception of *Cs* ($R^2 = .122$):

- *CWEr* was included without *Cfr, thus eliminating Cfr*
- Workplace values (*Wv)* were deleted and replaced with combined items:
    - *Wv1 + Wv4 = Wv11*
    - *Wv5 + Wv3 + Wv2 = Wv12*
    - *Wv7 = Wv6 + Wv8 = Wv13*
    - *Wv9*
    - *Wv10*
- *Wv11* and *Wv13* were eliminated ($R^2 = .287$, $p = .021$)
- *PL* was deleted and replaced by *PL2* and *PL3*

This combination of items significantly predicted tier ranking, $F(10, 64) = 2.89$, $p = .005$; *CWEr* (w/out *Cfr*) and *Wv12* significantly contributed to the prediction. The adjusted R^2 value = .20; 20% of the variance in tier ranking could be explained by this model with a small effect size (Cohen; 1992). Beta weights show *job satisfaction* contributed most to tier ranking; the greater the satisfaction, the higher the tier ranking.

PREDICTING CREATIVITY IN ARCHITECTURAL PRACTICE

Eight indices describing the creative work environment (*CWEr*) were found to be significantly associated with creativity in architectural practice resulting from the regression equation. These measures included *creativity of the job or firm* (*Cfr)*, *organizational encouragement (Oe), leadership support and feedback (Ls), intellectual stimulation (Is), challenging work (Cw), the product leadership value discipline (PL), workplace values (Wv*), and *job satisfaction (Js).* Correcting for multicollinearity, *leadership support and feedback (Ls)* and *organizational encouragement (Oe*) were eliminated, and *product leadership (PL*) and *workplace values (Wv*) combined (Table 5). This combination of variables significantly predicted *Cfr*, $F(6, 65) = 35.81$, $p < .001$ with all variables except *self-evaluation of creativity (Cs)* contributing significantly to the prediction with an adjusted $R^2 = .74$; this is a much larger than typical effect size. The beta weights, presented in Table 6, suggest intellectual stimulation (*Is*) and *PL+Wv* contribute most to predicting *Cfr,* with challenging work (*Cw)* contributing to a lesser extent.

Table 5 Means, Standard Deviations, and Intercorrelations for Creativity of the Job or Firm (Cfr) and Predictor Variables (N = 71)

Variables	*M*	*SD*	1	2	3	4	5	6
Cfr	2.32	.60	-.05	.76**	.67**	.58**	.29**	.80**
Predictor Variable								
1. Self-evaluation	1.60	.57	--	.13	-.11	-.07	.08	.12
2.Intellectual stimulation	2.60	.70		--	.54**	.49**	.20**	.73**
3. Challenging work	1.97	.52			--	.43**	.14	.61**
4. Job satisfaction	1.63	.61				--	-.04	.59**
5. Tier	1.71	.46					--	.29**
6. *PL + Wv*	2.52	.53						--

** $p < .01$; * $p < .05$

Table 6 Simultaneous Multiple Regression Analysis Summary for Cs, Is, Cw, Js, Tier, and PL+Wv Predicting Creativity of the Job or Firm (Cfr) (N = 71)

Variables	*B*	*SEB*	*β*
Self-evaluation (*Cs*)	-.12	.06	-.12
Intellectual stimulation (*Is*)	.28	.08	.33**
Challenging work (*Cw*)	.22	.09	.19*
Job satisfaction (*Js*)	.12	.08	.12
Tier	.14	.08	.11
PL + Wv	.40	.12	.35**
Constant	-.02	.22	

Note: $R^2 = .74$; $F(6, 65) = 35.81$, $p < .001$; ** $p < .01$; * $p < .05$

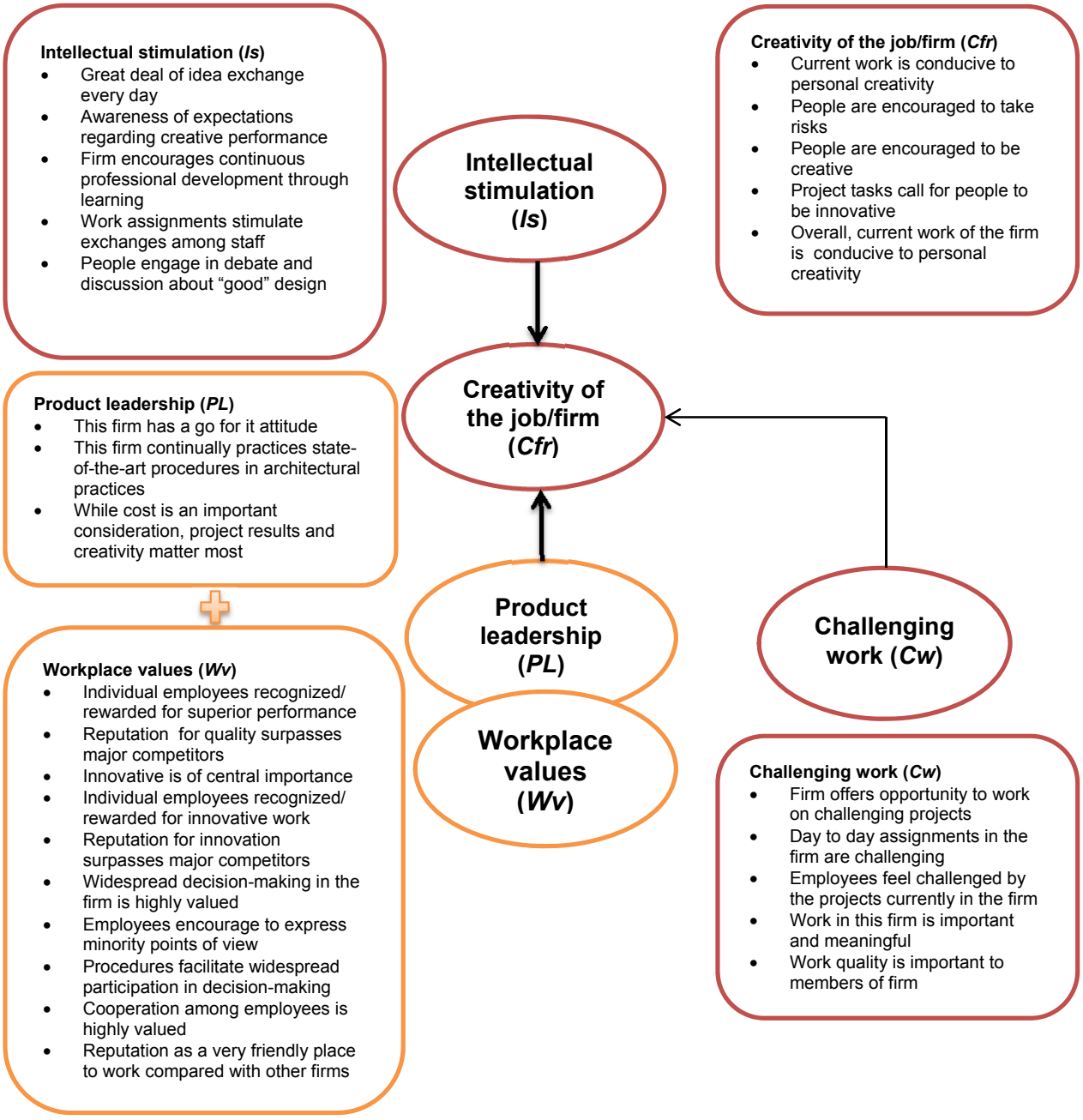

Figure 2 Intellectual stimulation, product leadership + workplace values, and challenging work as influencers on creativity of the job or firm as a component of organizational creativity (Leigh, 2011)

DISCUSSION

This study sheds light on factors for consideration by design management regarding the leveraging capabilities of organizational creativity to impact annual revenue as a measure of performance. Creativity was found to have a direct yet fragile relationship to performance contradictory to the study by Eskildsen et al. (1999). In addition, six of ten measures confirmed in earlier climate studies of creative work environments were found to have poor reliabilities, contradicting findings of earlier studies (Amabile et al., 1996; Amabile & Gryskiewicz, 1989; Damanpour, 1991; Haynes et al., 1999; Hunter et al., 2007) raising the possibility that creative organizations differ from non-creative organizations specifically in terms of time pressures and demands and resource availability.

Intellectual stimulation, the value discipline of product leadership, and workplace values appeared to strongly influence organizational creativity and to a lesser degree, challenging work. Findings support the more creative the firm, the greater the revenues; firms can benefit from understanding dimensions of creativity in the workplace to enhance their performance ($$).

Shalley, Gilson, and Blum (2000:216) stressed the importance of complementary work environments inclusive of proximal (job complexity) and distal job factors. Jobs designed to be highly complex, similar to work roles in architectural practice, offer greater incentive to be creative especially in environments where creativity may be manifested as an intangible "requirement" (Unsworth et al., 2005).

An inverse relationship was found between creativity and length of tenure in practice. This may be a daunting finding to senior design management, and may bear further attention in terms of how one embraces the factors of creativity as practice tenure approaches a significant length of time.

The exploratory nature of the this study attempted to create a foundation for future studies of performance, moving into more proprietary realms requiring firm sponsorship to examine additional performance variables. However, certain features of the study suggest if practitioners could evaluate contributions to creativity, it might be possible to track and monitor changes, improvements, or decline in creativity.

Findings supported the assumption that organizations characterizing themselves as creative would align with the product leadership value discipline, as an indicator or innovation. The measures developed for the three value disciplines described by Treacy and Wiersema (1995) were useful in confirming firm employees' value choices, with operational excellence reflected as a negative relationship and respondents reflecting stronger alignment with product leadership than customer intimacy value structures. Responses to these measures suggest firms may be able to refine decisions regarding Treacy and Wiersema's (90) operating models by using these indices.

FIRM CREATIVITY PROFILE

A Firm Creativity Profile was developed in response to the second objective of this study, to provide practitioners with useful tools to measure creativity in their firms. The FCP is a paper and pencil evaluation comprised of 15, five-point scales derived from the measures found to be significant in this research study. Rating 1 as disagreement with the statement and 5 as agreement, a tally of all values would provide a summative score. A score of 51 or less would indicate less potential for organizational creativity and point out areas that might be examined, 45 would be about average, with scores closer to 75 indicating greater potential for organizational creativity. From the study findings, if greater creativity is aligned with greater revenue, firms could utilize the FCP to examine periodic relationships between scores and revenue growth, identify areas for improvement and professional development, and for the development of tactics aimed at improving creativity of the firm.

LIMITATIONS AND AVENUES FOR FUTURE RESEARCH AND PRACTICE

Increasing the number of firms and respondents would allow greater affirmation of findings from the study; case study analysis of a sampling of firms to expand upon findings would invite elaboration of the items within indices constructed in this study. Although a great number of architectural practices are in fact sole practitioners, since the majority of research studies of non-creative organizations focused on large scale organizations, the firms in the study allow examination of creative to non-creative firms. Finally, data collected on the FCP use by firms would continue to refine an instrument of use to design management.

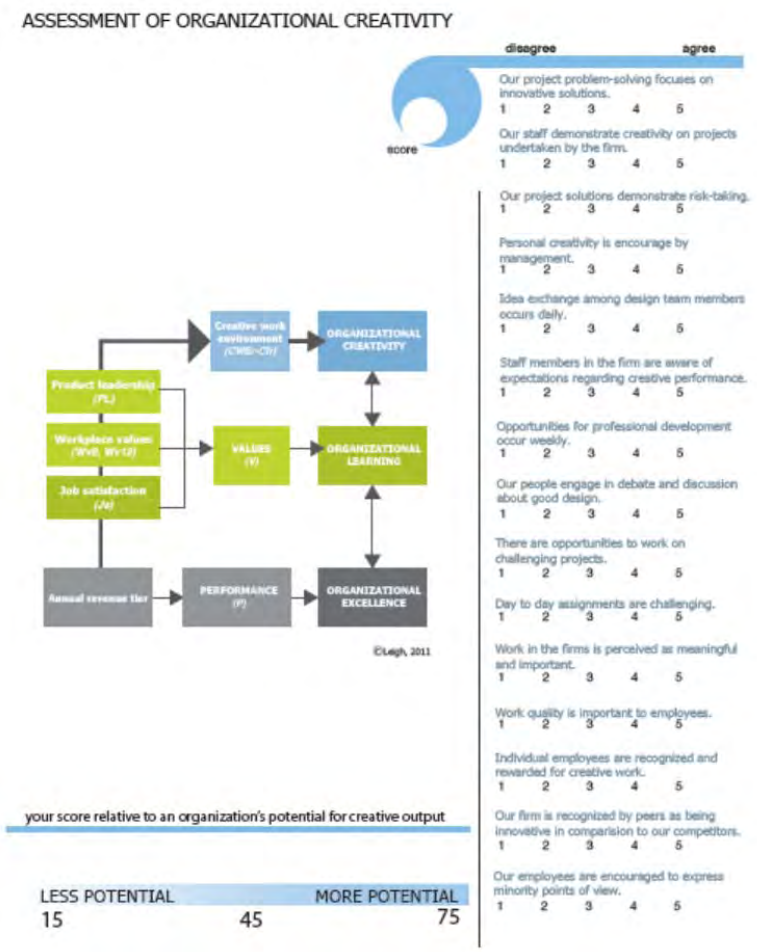

Figure 3 Preliminary Firm Creativity Profile (FCP)

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LEADING
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MODELS OF DEVELOPING DESIGN CAPACITY: PERSPECTIVE FROM CHINA

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Although design in China is frequently criticized for being underdeveloped and lacking connection with industries, more and more Chinese brands are becoming known worldwide. Many of them utilize design as an important tool to obtain business success and build brands. However, their modes of practice are seldom studied by themselves or by academic researchers.
In this study, six criteria for evaluating design management practice in Chinese enterprises are identified through use of a large-scale questionnaire. Furthermore, based on in-depth interviews and case studies, six models of managing design are identified, which not only implies steps for establishing and developing design capacity in Chinese enterprises, but also represents an approach to design-led innovation.

Keywords: Competitiveness; Design capacity; Design management

INTRODUCTION

Design was not considered as a powerful competitive weapon until China joined the WTO at the end of 2002. After 2005, design management became gradually known by Chinese scholars based on published translations from Japan and other Western countries. At present, as one of the fastest developing countries, design in China is entering a new phase in its evolution, with a range of widely debated design policies. However, design standards and organization for design promotion, at various levels of government, are still lacking. Facing increasingly fierce competition, both in local and global markets, more and more Chinese companies have performed excellently in competing through design. People all over the world have been surprised by the Chinese power of creativity, organization and implementation for the 2008 Beijing Olympic Games, especially the opening and closing ceremonies. Do these achievements imply that design management had been utilized in China? If the answer is yes, what is the content that characterises the Chinese approach to design management? These are the initial research questions, which are raised from practice and lead to this study.

Concerning the growth of academic and research studies, although Chinese design management was introduced to bridge the gap between practice and industrial design education and research, its development revealed a further disparity. It soon became obvious that the juxtaposition of design management theories originating from the Western world, with the body of practice derived from Chinese local industrial experience brought other complications. In this instance, there is an urgent demand for research and study of design management practice in China in order to evolve a body of data and knowledge reflecting Chinese experience and needs.

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The purpose of this research is therefore twofold: description and exploration, which can contribute to the practice and theoretical framework of design management in China. It is through description that the 'facts' of a particular situation and event are established. A combined approach was employed in this study, primarily aiming at description to solve what, then going on to examine why the observed patterns exist and what they imply (Babbie, 2002). In this approach, the situation of design management in Chinese companies was first described to fill gaps in design management research and its practical development in China, as well as to constitute the 'facts' of this topic. The results were sorted as case studies to explicitly describe the situation of design management in Chinese manufacturers. Furthermore, the knowledge structure of design management in China was constructed, based upon it.

Since this is the first study of design management in Chinese manufacturing industry, there are many uncertainties in its scope and the results must in some respects be regarded as tentative. This leads to the second purpose, exploration, which is special suitable for examining a new interest or when the subject of study itself is relatively new (Babbie, 2002). Based on comparison of the key issues in cases, the common ground and differences of companies were explored, which were analyzed and reported as characteristics and models of managing design in Chinese manufacturing industry.

RESEARCH QUESTION

In this research, the initial main question is:

What is the situation of design management in Chinese companies?

This question emerged from the gap discovered from examining related literature. Though design management as a discipline has developed for over more than forty years, it is still viewed as an under-developed and under-researched discipline (Freeze, 1992; Potter, 1992). There is no existing body of literature or theoretical framework of design management in the world. Its situation in China is also laggard. There is still a gap about research into design management in China, although it is the fastest developing country, both in design and economy terms worldwide. Based on the initial question, the main research question addressed by this study is:

How is design managed in the practice of Chinese manufacturing industry?

This can be viewed at three levels: strategy, function and operation. At the strategic level, recognition of design and it's role in companies are involved. The functional level refers to how the design function in a company should be organized. At the operational level, utilization of design in a project is its main content.

Findings at the three levels contribute to an overall understanding of design management in Chinese companies. Various performance criteria are finally described on three levels, which are used as criteria for dividing different stage of managing design. Based on this, an approach to developing the management of design is explored. It also implies the evolution paths of recognition and development in design. They are capable of enabling Chinese manufacturers to define their stage of development efficiently and to adjust their methods of managing design.

RESEARCH METHODOLOGY

Though both quantitative and qualitative approaches have been influentially employed in previous studies of design management, a combined approach emerged since the 1990s with the development of the knowledge body of design management. The advantage of such combination is to integrate different paradigms at various stages in the research process to better understand a concept being tested or explored (Creswell, 1994). Since design management remains an underdeveloped, under-researched field, researchers prefer to achieve a full picture of any design management subject. This requires both detailed qualitative information from in-depth interviews or

case studies, and breadth provided by sample surveys (Freeze, 1992; Potter, 1992; Walton, 1992). However, it raises another question: how to organize the different paradigms in a single study.

As an answer, Creswell (1994) stated three models of the combination: two-phase design, dominant–less dominant design and mixed-methodology design. Although dominant-less dominant design is employed in most previous studies, the relationship between quantitative and qualitative research varies. The relationship can be divided into two types, QUAL-quan illustration and QUAN-qual illustration (Creswell, 2003). The former employs a quantitative method to analyze data, based on qualitative research. The latter utilizes qualitative method to study, based on the preliminary quantitative results. These two types of research have developed their own context in design management studies.

In a preliminary research of managing design in Chinese enterprises, the objectives of this research are to describe the practice of managing design in Chinese manufacturing industry and propose different models of managing design developed by various enterprises. For the former objective, hard and reliable data has been collected and analyzed by quantitative survey. For the latter, rich and deep data was achieved through qualitative interviews. As a result, this research employs a combined research approach. In simple words, it employs QUAN-qual illustration. In it, qualitative research was conducted by interviews and the results were reported in form of case studies, which are based on questionnaires for the purpose of verification and generalization. In addition, triangulation is introduced as a research strategy, both in research methods and data collection.

In the whole research project, “between-method triangulation” was utilized, which consists of questionnaire survey and interviews to collect data in sequential order. Methodological triangulation informed our decision to gather data through both questionnaire surveys and qualitative interviews, and then to analyze the data by content analysis and statistical procedures. A questionnaire survey was conducted to supply the data necessary to achieve basic knowledge about settings and to select the purposive sampling in interview at the first stage. Qualitative interviews played a dominant role in the research at the second stage. Case studies were completed based on the information collected from interviews. Through analyzing the ways of managing design in the cases according to the main criteria, conclusions can be drawn. In this paper, the main findings of second stage research are reported. It is directly obtained from interviews and case studies, based on criteria obtained in the first stage.

FINDINGS AND DISCUSSION

The whole structure of this research is shown in Figure 1. It includes three parts: background, Finding I, and Finding II. In the first part, an overview of design development in China is introduced. Then, research questions are identified based on descriptions of motivation for research. The purpose and significance of the study are introduced to demonstrate contributions to the research field of design management. This part discusses related literature and research methods of design management, which includes reviewing the main concepts and design management; a comparison of approaches to design in the UK, America and Japan; design development and design management; and the process and reasons for selecting a combined research approach in this study, based on reviewing previous studies of design management.

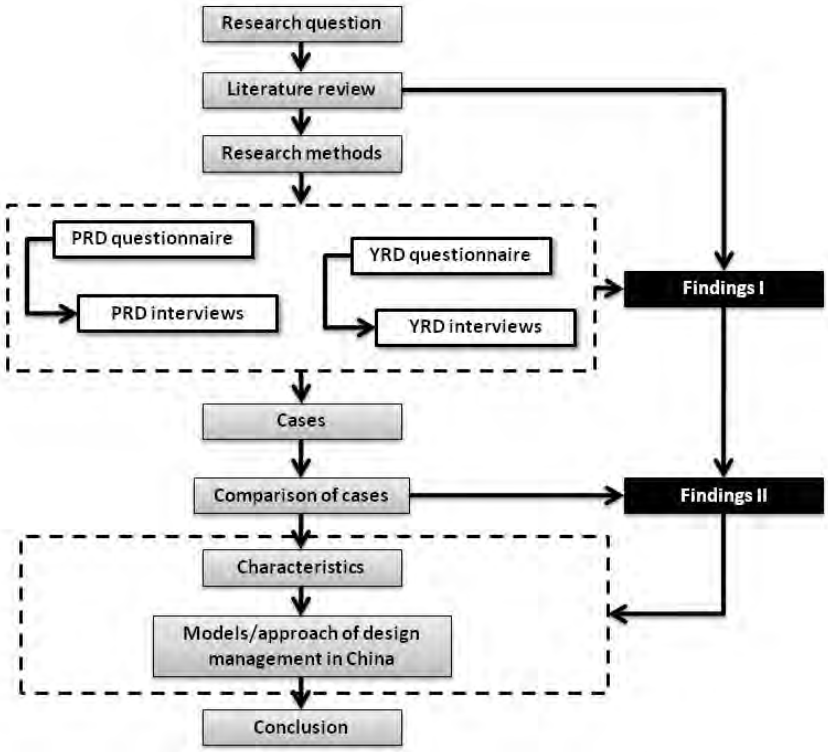

Figure 1 Structure of the research

The second part reports the findings of the first stage, which result from quantitative research, marked as Finding I in Figure 1. It has three aspects: firstly, a brief introduction of results from the data analysis of questionnaires; secondly, a description of the basic situation of design in practice within Chinese manufacturing companies, based on frequency analysis of questionnaire answers; and, finally, the characteristics of design development in practice.

Finding II is the third part of the research, which is a result of qualitative research based on the findings of questionnaires. It begins by introducing the reasons for the final 12 cases, followed by a brief description of each case. Finding II is also the most important part of the whole research. It includes the characteristics of managing design based on comparative case studies, with an overview of managing design, models and approach to design management in China.

As a critical part of Finding II, models and approach of design management in these Chinese manufacturing enterprises are introduced in this paper. Contributed by Finding I, six criteria of evaluating performance on design management in Chinese manufacturers are identified. They are design awareness, internal design, external design, company size, design process and design as core competitiveness (Table 1). According to it, cases with similar performance have been grouped into six models as a final result. The relations among cases, criteria and models are shown in Table 2.

Table 1. Context of criteria

No.	Criteria	Measurement	Context
1	Size	Small	Number of employee: below 300
		Middle	Number of employee: from 300 to 20000
		Large	Number of employee: above 2000
2	Design awareness	Top manager	Only top manager understands the importance of design.
		Whole company	All staff in a company consider design is important.
3	Design and competitiveness	Design is a competitiveness factor	Design is defined as a competitiveness factor.
		Design isn't a competitiveness factor	Design isn't defined as a competitiveness factor.
4	Internal design	With internal design	An internal design team has been established.
		Without internal design	No internal design team in the company.
5	Design works assigned to	No designer	Staff in other functional departments, especial engineer, is responsible for design work.
		Internal design	Design works are completed by internal designers.
		External design	All the design works are assigned to external design. Company may hasn't internal design, or its internal design is only responsible for communicating and managing outsourced design.
		Internal & external design	Both internal and external design are main power for completing design project.
6	Design process	Flexible	Design process is not a fixed one.
		Standardized	Design process is documented as a fixed one.

Table 2. Six models of managing design

Size	Product	Design awareness	Design and competitiveness	Internal design	Design works assigned to	Design process is	Case
Model A. Design by no-designer							
Small	Luxury sports	in top management	Design is a competitiveness factor	Without internal design	Engineer	Flexible	Ted Golf
Model B. External design as internal design							
Middle	Eye massage	in top management	Design is a competitiveness factor	Without internal design	External design	Flexible	Breo
Model C. B2B							
Small	Bank financial service	in top management	Design is not a competitiveness factor	Without internal design	External design	Standardized	Hiaward
Model D. Design follower							
Middle	Wood toy	in whole company	Design is not a competitiveness factor	With internal design	Internal design	Standardized	Ruyi
Large	Stationary						Genvana
Large	White home appliance						Hisense
Middle	Feed machine						Muyang
Model E. Styling-focused							
Large	Sterilizing cabinet	in whole company	Design is a competitiveness factor	With internal design	External design	Standardized	Canbo
Large	Microwave						Midea Microwave
Model F. Design-oriented							
Large	Outdoor goods	in whole company	Yes	Yes	External & internal	Standardized	Heng Feng
Large	Kitchen appliance						Vatti
Large	Multi-media appliance						TCL

MODEL A. DESIGN BY NO-DESIGNER

The main characters of companies in this model are: small-size; good design awareness limited to top management; no internal design team; function of design replaced by other functional staff, such as engineers, instead of outsourcing; design as a core competitiveness; flexible design process; and small industry (Figure 2).

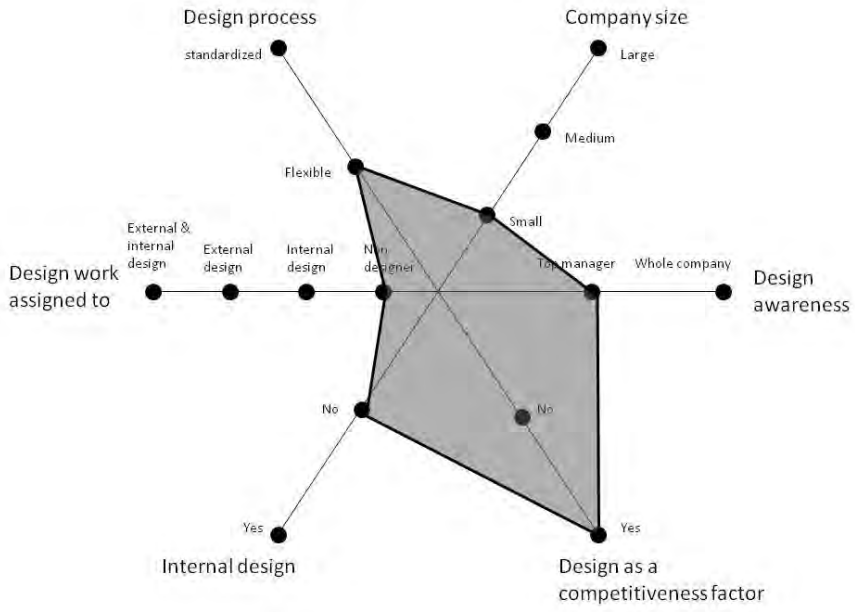

Figure 2: Positioning diagram of Model A.

Although companies in this model have a short history and are small sized, the top managers have recognized the value of design and view it as a competitive factor. However, there are still no internal designers in the companies because of four factors:

1) Good design awareness is limited to top management and does not reach every employee. Since not all employees have realized the importance of design, establishing design ability is not viewed as a critical issue for business development. 2) A lack of adequate financial support due to limited scale and short history. For small-size companies, their business is usually at primary stage. This not only means underdeveloped design awareness, but also limited finance. In this instance, establishing an internal design department means a high-cost investment in China. This seems impractical at the current stage. 3) A small space for styling because of the character of products. Styling usually is not a critical factor of products produced by companies in this model. Since function and structure are the most important elements, in this instance, styling has to follow them. 4) A lack of professional designers specializing in products for small industries. Small industry implies limited demand for design work and limited design resources can be utilized. Since companies have difficulty in finding designers with related experience, they have to train designers themselves. This also means high-cost investment.

Because of these reasons, to realize the value of design, top management promotes design by directing other functional staff to play the role of designer. Only in this way can styling be efficiently integrated into the function and structure of products. In addition, flexible processes are established and developed to utilize available talents in a maximum degree for new ideas.

MODEL B. EXTERNAL DESIGN AS INTERNAL DESIGN

The main characteristics of companies in this model are: small-size; good design awareness limited in top management; no internal design; design works outsourced to external design; design viewed as a core competitiveness; a flexible design process (Figure 3).

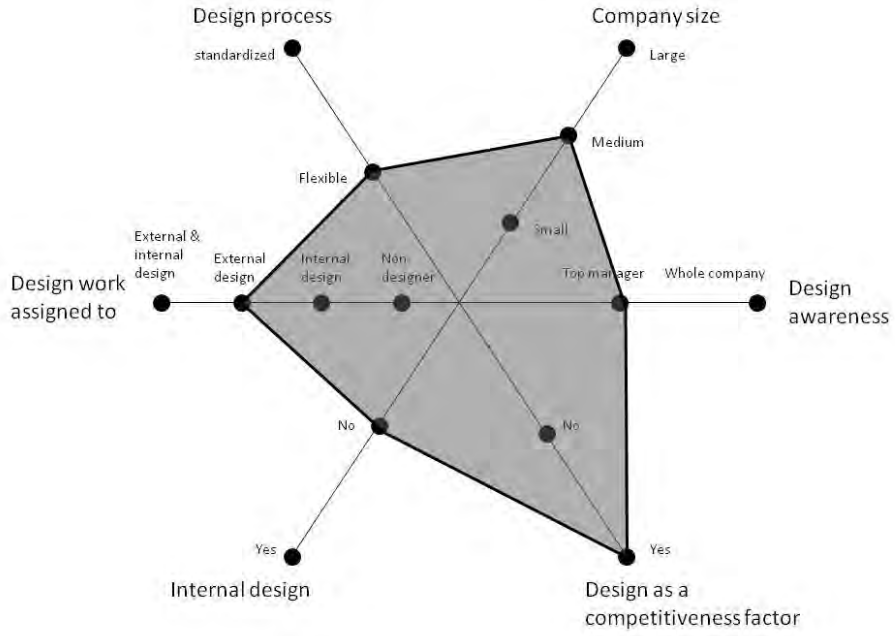

Figure 3: Positioning diagram of Model B.

Similar to companies in Model A, companies in this model are also small-size and design awareness is limited in top managers. As a result, though design is viewed as a competitiveness factor in business development, companies still lack ability and motivation to establish their own design teams. In this instance, they combine their limited research and development ability with external design to form a full-function team for product development. With this structure of project team, a flexible process has to be used. Based on it, an internal design team can work with external designers efficiently. Moreover, staff members who are interested can be found to study design during such collaboration.

However, differing from Model A, companies in this model are not restricted to small industry, but are often found in larger units, which implies adequate design resources, including experienced designers and design firms. There are various options of outsourcing design with low cost.

Furthermore, with limited business scale, companies in this model often prefer to collaborate with freelance designers, instead of design firms. There are two reasons for this. Firstly, freelance designers cost less than design firms; secondly, they more easily establish close relationships with enterprises than design firms. In the practice of these Model B companies, freelance designers work in similar ways to internal designers. They can offer their professional opinions in any stage of a product development process at any time. This meets the requirements of flexible processes.

In addition, cooperation with freelance designers means that companies have more space to select appropriate designers within limited budgets. Companies also can select different designers for projects varying in product type, market region and consumer type. For example, a foreign designer might be considered to be helpful for designing products launched in overseas markets.

MODEL C. B2B

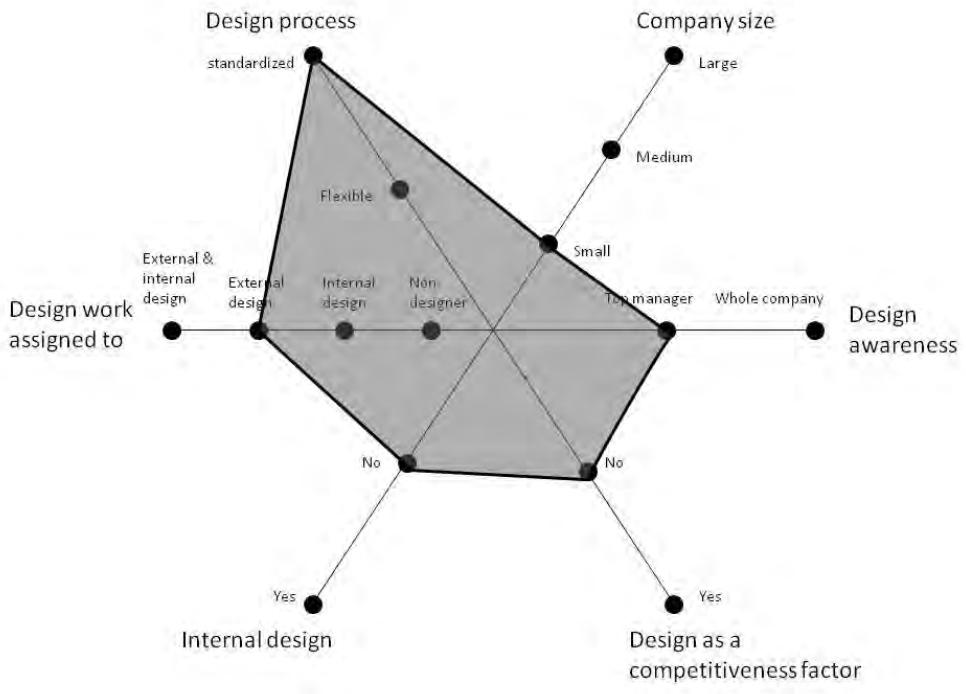

Figure 4: Positioning diagram of Model C.

The main characters of companies in this model are: good design awareness in top management; design is not viewed as a core competitiveness factor; no internal design; outsourcing design; and a standardized design process (Figure 4).

Differing from other models, products manufactured by companies in this model usually are various types of instruments, bought by other companies as manufacturing equipment, instead of consumer products for end-consumer.This means that these companies do not directly serve terminal consumers, but other business entities. In simple terms, its business model is B2B (business to business), instead of B2C (business to consumer).

For instrument products, styling is less important than function and structure. Design work in the model usually refers to package design, interface design, corporate identity and advertisement, instead of product styling. In this instance, though their top management understands the role and value of design, design does not play an essential role in their business, and is not viewed as a core competitiveness factor. There is no need to establish an internal design department, because they can employ design firms to complete their design work conveniently. Since the role of design is not so important to a product, a standardized design process generally is utilized to control schedule and quality of outcomes. In addition, because design is involved in product development processes as a subsidiary function, companies would not like to invest too much in it at the current stage. However, with development of the business, corporate identity might be viewed as an important factor for brand building in the future, which will need more investment in design.

MODEL D. DESIGN FOLLOWER

The characteristics of companies in this model are: good design awareness in the whole company; design is not viewed as a core competitiveness factor; design work completed by internal design; and standardized design process (Figure 5).

Though companies in this model have shown good design awareness in their staff and internal design departments have been established in them, design is only considered in terms of general

styling work, instead of as a core competitiveness factor. This results from their negative attitude toward developing internal design ability.

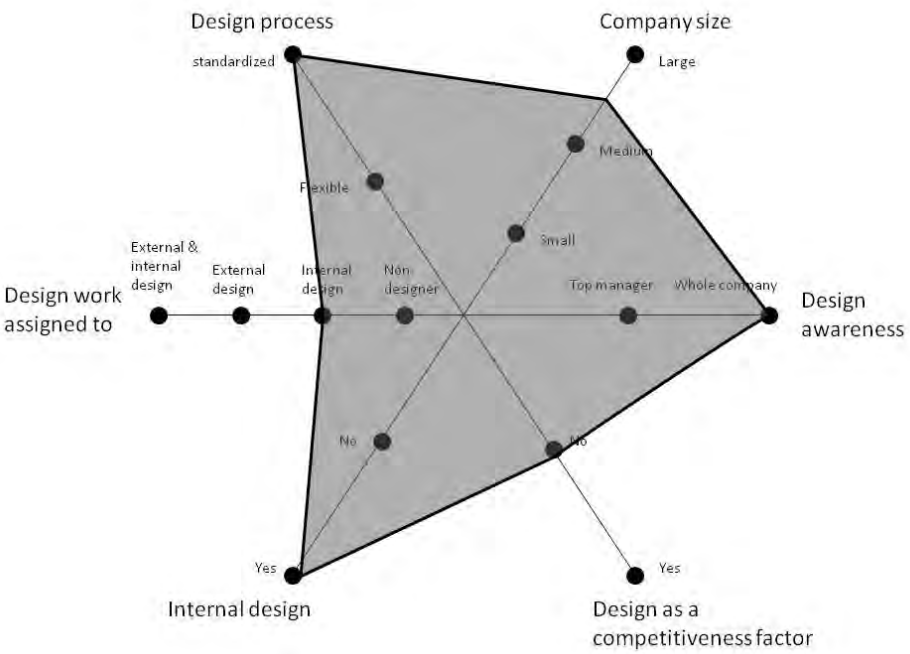

Figure 5: Positioning diagram of Model D.

Companies in this model generally do not take a leading place in markets. In fact, they begin to establish internal design teams just because their competitors all have done so. To survive, they have to invest in design. As a result, they are easily satisfied with their current design ability, and do not wish to invest more in developing it.

Good design awareness of all staff is the result of its industry environment, in which the importance of design has been demonstrated and confirmed through successful products and market competition. Contributed by the design function, leading companies have won markets through successful products. As a result, the value of design is well known in the product category. As followers in such markets, companies in this model only utilize design for styling and emphasize developing design ability to a limited degree. Design neither is integrated into business strategy, nor is viewed as an element of core competitiveness.

MODEL E. STYLING-FOCUSED

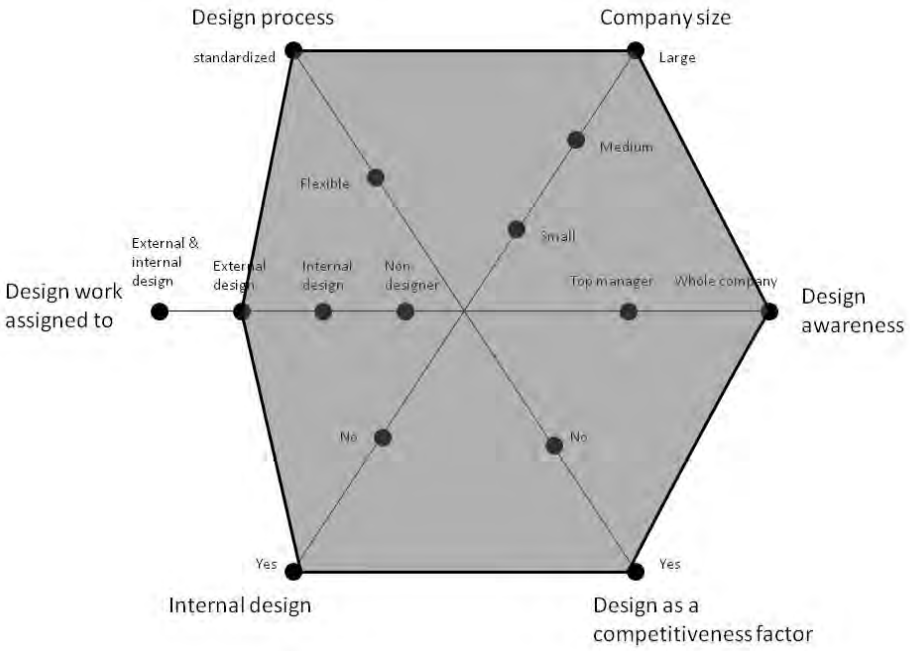

Figure 6: Positioning diagram of Model E.

In this model, companies usually are medium or large size and there is good design awareness in the whole company. Based on it, design is viewed as a core competitiveness factor and internal design departments have already been set up. However, most design work is still outsourced, according to their design strategies (Figure 6).

Generally, companies in this model usually focus on one type of product, especially certain home appliance and consumer products without hi-tech. Within the product type, they develop their skills well and generally take leading positions in markets. Canbo and Midea Microwave are cases involved in this model. Instead of a wide scope of products, they just produce a special kind of home appliance: one is sterilizing cabinet; another is microwave. And they both occupy a leading place in their product markets in China. Canbo is the No.1 brand of sterilizing cabinets, while Midea is the No.2 in microwave markets.

Without breakthrough technology, continuous innovation in styling and product concepts are viewed as essential to keep their leading place. Based on one specification, a family of products is established to cover various consumers and markets. Also because there are no sophisticated technologies to be applied in developing new products, the cycle of product development is very short. This leads to a large quantity demand for design work. If all the work is completed by internal design, a large scale internal design team would be established. This means a large amount of investment in establishment, operation and management. As a result, the companies prefer to outsource the majority of their design work as the most efficient way to solve the demand for styling. Equipped with experienced designers, the internal design departments just focus on managing design projects and external design, as well as communicating with external design and other functional departments.

MODEL F. DESIGN-ORIENTED

Companies in this model not only have excellent performance in markets, but also represent the leading development of design in Chinese enterprises. The function and value of design are recognized by all the employees and are emphasized especially by their top management. The

work of internal design is connected tightly with corporate strategy. Though their internal design ability has been well-developed, they still collaborate with external design consultancies to enhance their design ability and to expand overseas markets (Figure 7). Usually, a long-term relationship with external design is established. Design consultancy is considered as a strategic partner, instead of a styling supplier. Because of intense demand on external design, their partners usually are foreign design consultancies with experience of strategic planning.

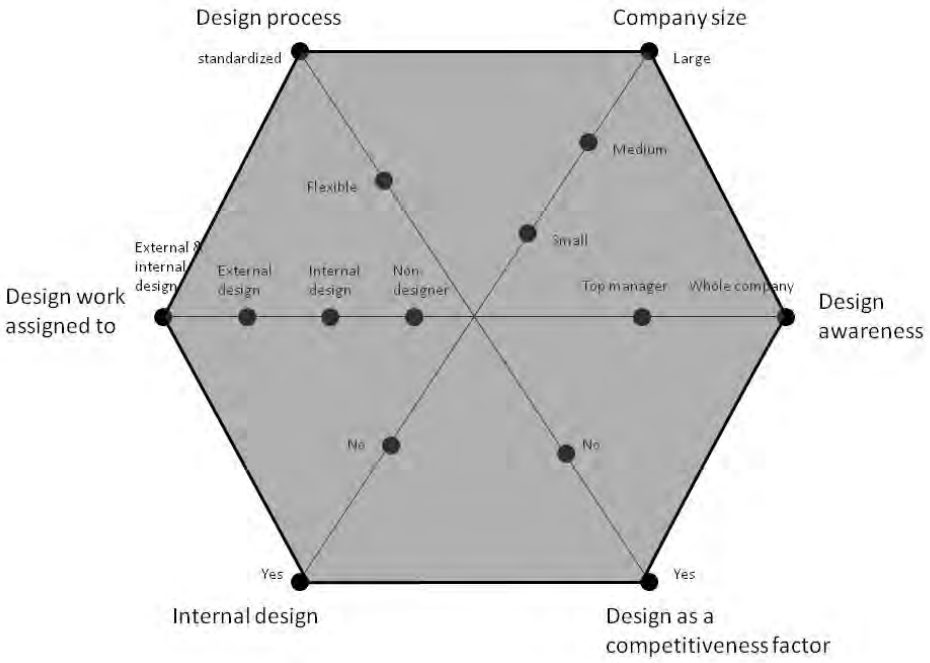

Figure 7: Positioning diagram of Model F.

During the process of developing a new product, design takes a leading role in planning projects, generating ideas, controlling quality, managing projects and coordinating other functional departments. In the practice of these companies, design is so important that top-level managers are directly responsible for design work and related issues. In this instance, companies in this model can be viewed as design-oriented. As Tore Kristensen defined, "design oriented means that the firm's core values are infused by design ideas and design is institutionalized into the firm's strategic orientation. In addition, the firm has a top level manager responsible for design (Kristensen, 1998: 232-3)."

WAYS OF DEVELOPING DESIGN ABILITY

In the six models, there are two relating to special situations: Model A-design by no-designer and C-B2B. Compared to Model B, Model A is similar. The only difference is model A is in small industry, in which seldom design resource can be obtained. In Model C, companies produce instruments for other companies. In most cases, design is not defined as a critical factor of competitiveness. In this instance, concerning generalization of using, managing and developing design, the other four models are representative. They all produce general consumer products, which implies they have same external environment, including consumer, market and design resources. As a result, a three-stage approach to developing design ability can be obtained based on an analysis of relations among the four models: Model B, D, E and F.

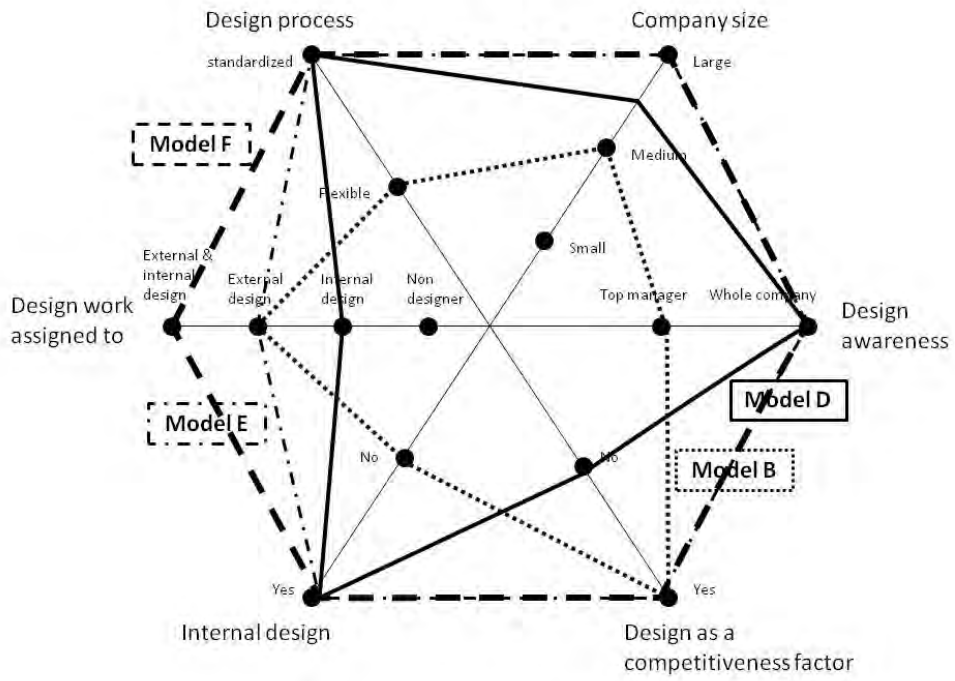

Figure 8: Coverage of four models

Through comparing the four positioning diagrams of models and studying their coverage relationship (Figure 8), it can be found that the four models are at three levels (Figure 9), which reflect three stages of design development and managing design. The third level is at the bottom level, which includes Model B – external design as internal design and Model D – design follower. Model B is in the early stages of using design with an active attitude, but lacking experience and knowledge of design, they have to rely on external sources. Though Model D has utilized design for a long time, their attitude towards it is essentially negative. They have to invest in design for survival in market competition. In the two models, design is only viewed as a tool for new styling and a sub-function in whole product development process. The second and middle level is Model E: styling-focused. In it, design function is considered as an important part of product development and as a critical factor of competitiveness with positive attitude. The operation of design focuses on the organizational level, especially the relation between internal and external design. Generally, external designers are hired to complete styling works, while internal design take the role of managing design, such as communicating and evaluating. The top and first level is model F: design oriented. In it, design is considered at strategic level. This means that design takes a leading role in product development. This finding shows that the four models demonstrate a three-stage process of developing design ability with two start-points. The three-stage correspond to three levels of design management. Finally, two development channels are evident: the first is from Model B, E to F, the second one from Model D, E to F.

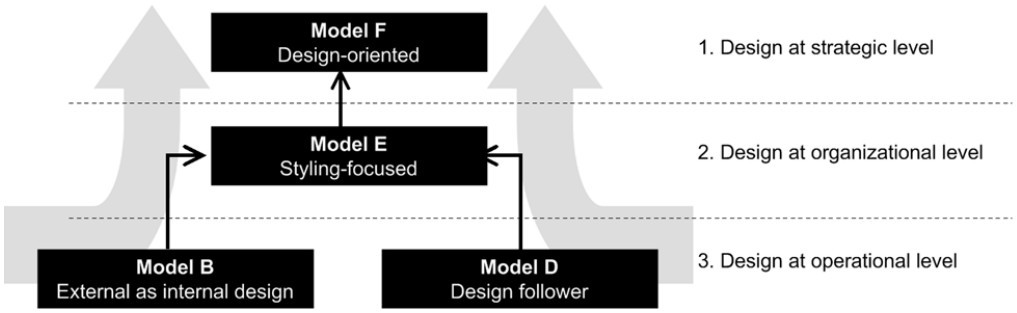

Figure 9: Two ways of developing design ability

The first starts from companies in Model B, in which top managers have good design awareness and view design as a significant competitiveness factor. However, as medium-size companies they still cannot afford the high-cost of investment in design. Their solution is to outsource design instead of establishing their own internal design departments. To use external design to a maximum degree, they prefer to employ freelance designers who can work closely with them. To achieve this objective, a flexible design process is used. When companies develop to the second level, their scale grows bigger and good design awareness has been expanded to all staff. Based on progress in the business, the companies can establish their own design departments. To manage them efficiently, the flexible design process is changed to a standardized one. When they develop into the top level, the focus of their design ability is strategy planning. To create space to assess experience and expand their knowledge, they outsource some design work to leading design consultancies.

In contrast, the second way begins from Model D, in which companies usually have a negative attitude toward design. Though they have recognized the value of design, established internal design department and formed a standardized design process, they do not view design as their core competitiveness factor. Compared to competitors in their product categories, they are design followers with limited design ability. If these companies plan to upgrade to Level Two, they must change their attitude toward design into an active one. Only after that, could they follow the same routine of development to the top level as the first way.

The six models and the two ways show the possible directions of developing design ability in a company. The six models offer a reference for companies to evaluate and find their own locations in their ways of developing design ability. With the three levels, they can define their development stages accurately. Based on the two ways, they can plan their own solution of developing design ability.

CONCLUSION

The main research question of this study, “how is design managed in the practice of Chinese manufacturing industry”, reflects two gaps. One is in the scope of knowledge of design management in China. This particularly emphasises how to establish a body of knowledge in design management, based on the distinct nature of Chinese practice. Another gap is between western theories about design management and Chinese practice in industry. The problem here is how to adapt current knowledge of design management, which is established based on western practice and understanding, to Chinese manufacturers’ practice of managing design. The findings of this study demonstrate its contribution in bridging the two gaps.

Based on large-scale surveys, a database of managing and developing design in these manufacturers in the PRD and YRD has been established with rich and first-hand data. It is also

the first one of this kind in China. Combining with findings of six criteria for evaluating design performance and six models of managing design, the practice of design in each manufacturer is generalized and structured into a knowledge body. This can be not only a platform for further study, but also efficient guidelines for practice. Concerning the second gap, the two approaches to developing design capacity demonstrate a path corresponding to three levels of design management, which is a major feature defined by western scholars practice. This shows the possibility and scope of connecting current western knowledge of design management with Chinese practice in industry.

For practical application in industry, these findings offer successful experience and practical solutions as references. Each enterprise can re-consider, re-plan and re-define its own strategy and position based on it. By expanding the knowledge body of design management, this study contributes to better understanding of the potential of industrial design in the Chinese context.

Research on this project is still on-going. A second-round study has just been completed. In it, all the samples have been interviewed again to understand how they survived the financial crisis, beginning in 2008, and the contribution made by design. The database will be updated and enriched based on this expansion of the project scope and various ways of using design in different models of managing design will be developed in more detail.

ACNOWLEGMENT

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LEADING
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DESIGN & BRAND: MANAGING THE RELATIONSHIP

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Within the existing literature on brands, little attention has been paid to the contribution of design to the development of a pertinent brand experience. This paper examines the potentially cohesive role of design in creating a distinctive brand experience, and is an attempt to reveal the managerial conditions that could enhance the collaboration between designers and brand managers. The exploratory approach relies on in-depth interviews of 45 design managers, conducted in a French context. The results underline, for the firms being studied, 1) a greater understanding of the crucial role of design for both innovation and the creation of the brand concept, 2) a lessened awareness of its benefits for the tactical & operational management of the brand experience, and 3) various practices of Brand Design Management among different industries.

Keywords: Brand Experience; Brand Design Management; Qualitative Methods

INTRODUCTION AND RESEARCH OBJECTIVES

The consumption experience has recently become a major field of research for academics attempting to better understand consumer behavior (Caru & Cova, 2006). From a managerial standpoint, experiential marketing has led brand managers to build “experiential brand contexts” in order to enhance the consumer’s immersion in a brand experience (Caru & Cova, 2006:1). When in an experiential consumption situation, the traditional functional attributes, as well as the hedonistic, aesthetical and emotional characteristics of products and services offered by a brand will be the main determinants for a unique valuable brand experience. In this perspective, design appears as one of the major tools for the brand managers to develop the brand experience.

In the management literature, numerous academic articles have confirmed that design highly participates in the innovation process (Verganti, 2003) and that it is, in itself, a major source of competitive advantage for companies (Steinbock, 2005). In the marketing literature, recent research has proven the crucial role of design as a source of differentiation to manage experiential brands (Borja de Mozota, 2007; Montaña, Guzman & Moll, 2007). Indeed, design allows developing products and services that are aesthetically & emotionally pleasant and more appealing for the hedonist consumer. When the company takes on a Brand Design Management approach, design also appears to be a key factor to better structure the different elements of the brand experience: through its cohesive role, the brand-oriented design facilitates and optimizes, in consumer’s mind, the understanding and perceived coherence of the proposed brand experience (Montaña et al., 2007).

The literature review shows that many authors have pleaded for a more important integration of the marketing and design functions (Beverland, 2005; Borja de Mozota, 2003). Nevertheless, it also underlines that contributions studying the role of design in the creation and management of the brand experience still remain scarce (Montaña et al., 2007).

In practice, and despite the numerous actions developed by governmental and professional bodies to promote the design discipline within companies, it appears, from the latest sectoral surveys, that French companies are yet not aware of the potential contributions of design: 60% of the interviewed companies state that they do use design and 49% of them only in a very limited and occasional way. Companies bring in design mainly for product development (50%), at the end of the innovation process (21% of the companies). It turns out that, for French companies, the upstream integration of the designer in Branding remains weak, as it only concerns 12% of the firms vs. 77% of British

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companies. The explaining factors, according to the designers & managers interviewed, are here mainly related to the misunderstanding of the design function, a lack of design culture within the company and a bad perception of design's real costs (Etude Economie du Design*, APCI – IFM –Cité du Design 2010; Etude sur les Practiques du Design en PMI†, Ministère de l'Economie, des Finances et de l'Industrie, 2002).

In the meantime, many international companies hire famous French designers to create or reposition their brands and to develop successful brand experiences for their customers, either in the fast-moving consumer goods industry (eg. Heineken & Ora-Ito in 2006), the services sector (eg. the Royal Monceau Palace & P. Starck in 2010) or for industrial goods (eg. Target & P. Starck since 2000).

Keeping this in mind, and to contribute to research on the integration of design in firms' marketing strategy, it seemed interesting, in a French context, to question 1) the contribution of design management to the development of a coherent brand experience, and 2) the managerial conditions creating bases of collaboration between brand managers and designers. Since this domain has not extensively been studied, we have decided to adopt a qualitative exploratory approach for this research. More precisely, we have selected the semi-directive in-depth interview method.

This paper will be divided in three parts. In the first part, a literature review of the contribution of design to brand management will be presented. The organizational conditions allowing an optimal integration of design will also be highlighted. On the basis of the methodology used, we will expose the obtained results, in the second part. Those will be discussed with regards to the existing literature. Finally, the managerial implications of this research will be addressed in conclusion.

LITERATURE REVIEW

This part will expose the potential contributions of design to brand management and to develop a successful brand experience. It is will also highlight the necessary organizational conditions enabling an enhanced collaboration between designers and brand managers.

FROM BRANDING MANAGEMENT TO A BRAND EXPERIENCE PROPOSAL

Nowadays, it is acknowledged that the brand is one crucial intangible resource for the firm. As a result, and since one decade, brand management has been at the heart of marketing managers' concerns in order to develop a really distinctive and valuable offer to consumers. Academic research on branding has been prolific (for an extensive literature review on those themes, please refer to Brakus, Schmitt & Zarantonello, 2009). In the current experiential consumption context, researchers have recently studied the brand experience, to better understand how consumers do feel and live this experience (Caru & Cova, 2006).

The brand experience can be defined as the set of subjective, internal (sensation, affect and cognition) and behavioural reactions of the customer to the brand stimuli and touch-points (Brakus et al., 2009). In this holistic perspective, the selection & consumption of a specific brand will then be based on product's functional attributes and on a specific set of brand attributes. This set of brand attributes conveys emotional, aesthetical and hedonistic dimensions, with the aim of facilitating brand narration and brand social functions (eg. brand colours, forms, typography, characters, background design elements...). For Brakus et al. (2009), those stimuli fall into the design of 1/ the brand, 2/ its identity (name, logo, and signature), packaging and promotion (advertising, websites, leaflets, event marketing) and 3/ its commercial environments. According to the authors, those stimuli are the foundation to elicit positive reactions & ultimately develop a successful customer experience.

Beyond the implementation of the traditional marketing plan, the brand manager must now develop adequate stimuli & set up the conditions of a positive and memorable brand experience - for each and every touch-point - in order to extend and nurture the brand –customer relationship & trigger positive loyalty toward the brand (Caru & Cova, 2006). Hence it appears that creating and implementing the constitutive elements of the brand experience will not just be related to the marketing function: indeed, some design competencies are also needed here. A greater collaboration between designers and brand managers is then more than expected to create and manage a pertinent brand experience.

DESIGN MANAGEMENT CONTRIBUTIONS TO DEVELOP A SUCCESSFUL BRAND EXPERIENCE

Management and Marketing scholars have recently acknowledged the potential contributions of design. Academic research in that field has confirmed the crucial role of both the design function and the design management process to innovate and successfully launch new products.

Design can then be considered as a facilitator of strategic thinking, a main source of competitive advantage for the firm and its brands (Gemser & Leenders, 2001) and even as a pertinent tool to revitalize existing brands (Perks, Cooper & Jones, 2005; Leonhardt & Faust, 2001). Yet, in the marketing field, little attention has been placed on how design can contribute to the development of a pertinent brand experience (Moll, Montaña, Guzmán & Parellada, 2007; Borja de Mozota, 2007).

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* *in English: Survey on the Design Economy*
† *In English: Survey on the Design Practices of the SME*

According to Borja de Mozota (2007) when a company adopts a brand design approach, the design team becomes more involved in the marketing management of the brand. In this context, designers can contribute to brand management at the strategic, tactical and operational levels:

- Strategic Brand Design level: by creating the Brand and developing Brand Equity
- Tactical Brand Design level: by designing Brand Identity
- Operational Brand Design level: by managing Brand Image

Table 1 Design and The Brand (according to Borja de Mozota, 2007: 318)

Brand Management	**Decision Level**	**Brand**	**Design**	**Design Objectives**	**Design Tools**
Creation	Strategic	Expression Positioning Expression	Intention Narration	Brand Philosophy Mission Vision Idea Historical Background Experience Precise Nature	Competitive Analysis Trends Scan Scenarios
Identity	Tactical	Brand Concept Values Brand/Offer Architecture	Concept	Aesthetic Universe and permanent principles Visual Architecture	Concept Boards Corporate Identity Brief Design
Image	Operational	Formal Expression	Creation	Formal specifications : location in a tri-dimensional space (affect, cognition, relationship)	Implementation guidelines for all media
Brand Equity	Strategic	Repositioning	Intention	Audit of the brand mission & renovation of the aesthetic codes	Permanent readjustment of the brand reference framework

CONDITIONS FOR A SUCCESSFUL IMPLEMENTATION

Montaña et al. (2007), arguing for a Brand Design Management Approach, state that some organizational conditions are needed to successfully create and implement positive brand experiences:

- Company's internal culture and design orientation: one crucial condition is that top-managers must be involved in the design management as it is critical to manage it efficiently. If design is not related to the overall strategy, any action that is undertaken will ultimately lead to failure.
- Innovative Concept Generation: in a Brand Design perspective, the starting point of the process is to analyze how the design function can be involved in the ideation process & in the definition of new concepts and also be associated to the marketing & other organizational divisions. The designers' role is here crucial to efficiently translate ideas into concepts, define and communicate them clearly to the rest of the company.
- Design strategy: it deals with the analysis of designers' role within the firm, for new product development and brand strategy. According to Perks et al. (2005), the design division can be involved in the overall managerial strategy at 3 different levels:
  - It can have a minor role in the innovation process, falling in the scope of marketing. Its involvement is then limited to the traditional tasks devoted to design: developing visual, aesthetic and technical aspects of the offering.
  - The design division can be involved in a multi-disciplinary team and have a more central role in the innovation process: design is involved in the new product development process and designers play a crucial role in enhancing & facilitating the relationships between all the actors of the process.
  - Design can also lead the innovation process: design is considered as a crucial source of innovation. Designers then guide the entire process of development of the offering.
- Managing design resources: this dimension relates to the management of the design teams (internal vs. external or hybrid teams), the way the innovation process is stimulated and knowledge is created, used and protected in the company.
- Implementation: this dimension refers to the execution and finalization of the design process. It can help in measuring the degree of innovation related to design and in understanding how design processes are coordinated, to better evaluate its contributions for the firm.

When those various conditions are gathered, the increased integration of the design function in the organization enables the use of a particularly pertinent tool to create a differentiated brand (Montaña et al., 2007).

The field analysis has shown that some of those conditions are poorly gathered in France. In this view, and with the aim of contributing to research on brand design management, it seemed interesting, for this work, to replicate the Montana et al.'s study (2007) on French companies, which exhibit a weaker integration of the design function. Following the recommendations of Montaña et al. (2007), we have retained some companies renowned for their design to build the sample. However, contrary to the authors, whose sample was based up to 73% on top-managers, we have decided to turn on to design practitioners. Indeed, previous work has underlined that a high degree of design integration in the overall strategy can be explained by an initial high level of involvement from top-managers (Borja de Mozota, 2003). From a methodological point of view, selecting only top-managers could lead to a bias of selection for the sample, and also to potentially extreme and biased discourses. In this context, and with the double objective of avoiding methodological biases and collecting more objective discourses, we have chosen, for this replication, to interview the design managers of the studied companies. In order to better apprehend the relationships between design and marketing, this replication will analyze more deeply, in a French context, some of the dimensions studied by Montaña et al. in 2007. Hence we will question the internal vs. external management of the design function and we will go more into details on the dimensions of the brand identity management & the design tools enabling to manage the brand experience in an optimal way.

METHODOLOGY

This research aims at uncovering the possible contributions of design to create a distinctive brand experience. More precisely, this work has a double objective: first, to study the cohesive role of design in the construction of an experiential brand offering & second, to analyze the organizational factors enabling the best integration of design in the brand strategy and management. This part of the paper is dedicated to the different methodological choices that we have retained for this research:

- Sample analysed: 45 design managers from 37 companies and design agencies operating mainly in France, in various sectors (services, industry, B2B ....). Interviews were conducted on a 9-months period, from December 2010 to August 2011. The length of the interview was in between 60 and 120 minutes, and lasted on average 90 minutes.
- Tools: choice was made to apply a qualitative approach, using the in-depth interview method. This individual and semi-directive interview was focused on the respondent's perception of the design function in his/her organization. Respondents were questioned about their role in the design orientation & strategy, the design management and the ideation process, the management of design resources and its evaluation. All of them closely related to their impact on the brand management and experience.
- Collected data analysis: the interviews were based on an interview guide. The collected data were then analyzed via a thematic content analysis. This consists in dividing the text in units of same significance. Researchers then proceeded to horizontal and vertical analyses of the different stories. This inductive method allowed us to understand what where the major themes and hence code them. The different themes that came out of the analysis were then interpreted on the basis of the existing academic literature on the links between design, the organization and the brand management.

RESEARCH FINDINGS

Several observations can be drawn from the data analysis.

INTERNAL CULTURE AND DESIGN ORIENTATION

Results show that most of the studied companies do have integrated design in the development &/or the implementation of their overall strategy.

The analysis of the various verbatim texts underlines that, in most of the cases, the design function is incorporated into another division, very frequently as a subordinate of the marketing team (Kallish, 2007). In companies with a higher focus on design, design can be involved at a strategic level as:

- a cohesive agent of innovation (Bertola & Teixeira, 2002; Tessarolo, 2007): the designer must then "be able to work as a project leader, be flexible and pro-active" (Cidetoys) to facilitate projects development as he/she is frequently "the only expert of his/her discipline within the company, with creative people hired less than 10 years ago to develop the internal design team" (Dorel, Manitou). His/her role is also to stimulate interactions between the various actors, thanks to his/her central position in the new product development process: "work is simultaneous and there are convergence points" (Dorel) between managerial divisions, hence coordination is needed.
- a driver of conceptual reflection and design thinking (Goffin & Micheli, 2003), an idea lab displaying the design reflection : ”the design team is very often considered as developing ‘concepts’, which frequently means ‘technological showcase’ “ (EDF), “ the design division is a lab that develops ideas and promotes those to stores” (Casino Group).
- and very often, as a functional specialist (Perks et al., 2005), dedicated to the development of innovative products.

In the industrial sector, the function is rather a subordinate of the R&D or the Innovation division. This can be explained by the greater internal focus placed on technological research, at the expense of design, that is still perceived as a simple tool to differentiate products or emotionally attract the consumer. In this type of structure, the internal perception of the design function is rather negative: for the Manitou design manager, “it is mandatory to frequently promote design in the company, in order to enhance the designers’ work”. Sometimes, this may even lead designers to have to legitimate their technological expertise in order to “be able to interact with the R&D team” (Bayer Material Science).

Results also show that a restricted number of companies distinguish themselves by the higher involvement of the CEO in design management and the close association between design strategy & top-management’s decisions, hence enabling the independence of design from other divisions: “ the design team directly reports to the top-management” (Cidetoys, Groupe Casino) “...as operations and marketing managers do” (Erard). “In our company, there is a design hub, in-between the top management and the brand managers” (Oxylane).

However, and even if most of the companies have integrated design either in an explicit or implicit way, it appears that the legitimacy of design is not always obvious within French companies. When the CEO’s level of involvement is high, design legitimacy is mainly based on the strategic vision of the top-management (Montaña et al., 2007): “it comes from the company’s policy. This is mainly due to the CEO’s influence and his strategic vision of design” (Salomon). When design falls in the scope of marketing, the analysis of the verbatim texts highlights that the main sources of legitimacy come, especially in industrial settings, from the technological or technical expertise of the designer (“degree in mechanical engineering, technical knowledge and mastering common language”, Manitou) and his/her abilities to enhance the innovation process and the product development cycle : “he [i.e. the head of design] gained legitimacy as he previously worked in the quality division, then at reducing the development cycle and finally in the design team : this enabled the shift from a Renault style to proper industrial design” (Renault).

Furthermore, interviewees underline that it is difficult to demonstrate the importance and relevance of design in their firm in order to get over the usual perception of “technological showcase” or “emotional design”. It’s not easy either to make actors (marketing, R&D teams) accept that design thinking must be considered and paid, especially when those actors make iterative orders: it is still “difficult to make people understand that you’re in the case of an invoiced thinking” (Erard). Our results confirm the tensions felt by internal designers, previously observed by Kallish (2007).

THE DESIGN STRATEGIES BEING IMPLEMENTED

The analysis of the respondent’s discourses confirms the Perks et al.’s typology (2005). In our sample, designers are either part of the global strategy, members of multidisciplinary teams, or an independent resource leading the innovation process. Each of these situations has different impacts in terms of branding management and customer brand experience.

First, it appears that design can be involved in the overall strategy - at the product development level. According to the design managers interviewed, and unlike Perks et al. (2005), this situation cannot really be considered as resulting in a “minor role” for design. For them, if this situation results indeed in a functional dependence of design (to the Marketing or R&D team), this doesn’t limit the impact of designers’ work. When design falls in the scope of marketing, one of its roles is to act in the brand management, through the creation of brand identity: “At Legrand, brand identities and DNA definitions are based on the brand promises. Those promises are defined and shared between marketing & design. The design team is then in charge of their translation into formal aesthetic codes” (Legrand), and of the “conservation & extension of the brand’s territory” (Arthur Bonnet).

Design can also be part of a multidisciplinary team, in which the designer has a crucial role in the innovation process, as it is the case for the Innovation Division of the Casino Group. In this context, the design team develops direct interactions between all the actors of the creation process and defines new avenues of work, and must be able to quickly build up and validate them: “Each innovation manager is in charge of a specific technology or market, with a vision that must be the largest possible in terms of eventual applications and product portfolio. With the tools used by

the design team, he is in charge of sculpting his field of work, according to the defined strategies and with the current portfolio in mind" (Bayer Material Science).

Finally, and more rarely, design can be an independent function, leading the innovation process (Montaña et al., 2007; Perks et al., 2005). For the respondents, this situation may lead to several problems, in terms of independence of thought and works' financing, that could quickly become critical, especially when research is not financed by the top-management, as it is for EDF R&D where the "marketing, corporate and sustainable development divisions provide around 80% of the design team's financing, the rest being provided by the R&D". According to them, the design team must be able to justify all the actions implemented as well as their financial and commercial contributions for the firm (Kallish, 2007).

MANAGING DESIGN RESOURCES

We will here present the arbitrations made by companies between in-house design, collaboration with external designers and hybrid organizations. These situations are influenced by the design strategies being implemented, and have several consequences on branding management. As an example, the choice of outsourcing creativity to develop the brand attributes may impact on the cohesiveness of the brand experience. It often leads the organization to establish an inside team of brand managers, in charge of working with the external designers to safekeep the brand's coherence on the long term.

With regards to the arbitrations made in terms of design resources management, results underline that the design function is nowadays internalized in most of the companies studied for this research, except Fabrica, that has had an external design director for 5 years, or the Accor Group whose head of design, Michel Gicquel, is an "independent".

It emerges, from the verbatim texts collected, that firms exhibit a strong willingness to internally keep and improve the creation of the brand concept. According to the interviewees, the brand concept must be created within the company, through "the establishment of more competent teams, mastering the global set of design tasks" (Cidetoys, Maped) & "expert in the products & services use" (Dorel). Our results then confirm the relevance of internal design for a pertinent branding, as previously suggested by Montaña et al. (2007). Internal design ensures on the long run the "homogeneity of the product range, its style and the brand identity & image": design is seen as one of the "brand signals" (Manitou). The company is thus able to ensure one of its intangible resources: "the brand and its identity".

A too frequent use of external design may indeed lead to the development of products that are too similar to competitors, which is quite "negative for the positioning and differentiation" (Renault). For the smallest companies, creating efficient internal teams can also result in reduced costs, compared to the use of external design. A progressive shift appears with "more creation and not just simple implementation for the internal design team", going up to the eventual avoidance of external design for some companies (Maped, Renault) to better monitor the brand design management.

Interviewees state that they are rather against the use of a superstar designer and a strategy of signature design. However, some respondents underline that collaborating with a famous external designer can help in benefiting from "the superstar designer's vision and expertise" (Fabrica, Impex) and in "enhancing brand image" (Dorel) through a "coherent co branding" (Seb Group) or by "developing breakthrough products" (Hager Security).Yet, in the end, signature design does not really "contribute to the brand identity" (Bel'M, Manitou) and "developing unique branded items is not relevant for the overall coherence of the global product line" (Manitou). Working with a superstar designer is "too expensive" (Fiskars, Cordescourant), often "at the expense of functionality" (Dorel) and may lead to "higher risks of inconsistency on the long run, due to his willingness to live a mark, without any considerations of what may happen after him" (Moswo). Beyond the fact that "using a superstar designer could create jealous rivalry in the company" (Hager Security), it is also perceived as not really pertinent nor adapted to the overall strategy (EDF, Maped, Fiskars, Ikea) or to the targeted audience (Maped). In some sectors such as the car industry, "the superstar designer often lacks the technical competencies" and it is too "long to train him" (Renault). Finally, for our respondents, using a superstar designer has no proven impact on sales (Fiskars). This can be explained by the "weak relationship between the designer and the brand" on which the designer worked, ending with a product "just bought by the designer's fans: that was the case for the Marc Newson's pan" (Seb Group).

All those factors led respondents to rather favour a long-term brand design strategy, with a "real brand value, without any superstar" (Salomon, Erard). Our results then contradict prior works pleading for a higher use of star designers to enhance the company's performance (Dell'Era & Verganti, 2009; Sunley, Pinch, Reimer & MacMillen, 2008).

At the same time, the interviewed designers do confirm that many companies use external designers. This use of external design can be explained by classic motives, previously studied in academic research on externalization strategies:

- In a cost reduction context (Mac Pherson & Vanchan, 2009), to "discharge some tasks when the internal workflow is too intense" in order to "keep on with the production and marketing timelines for the new product" (Seb Group), when "the internal team is understaffed, with more than 30% of the design being external" (Salomon) or when this team selectively uses external designers for "project management assistance" (EDF).

- With the view of acquiring external expertise and knowledge (Chiesa, Manzini & Pizzurno, 2004), to benefit from a "higher specialization of external design agencies on some specific tasks", "non-crucial for the brand" (Manitou, Erard, Hager). It may also concern competencies that are too expensive to build-in internally, as they are remote from the core business of the firm: "communication design" (Moswo), "production and development" (Orange), "packaging" (Groupe Seb), "design consultancy" (Moswo) or "style" (Dorel). The conducted thematic analysis shows, in fact and quite ironically, that companies externalize most of the design of brand stimuli.
- Finally, the externalization of the design function can be explained, for many companies, by their willingness to stimulate creativity, through the collaboration of external and internal teams, especially at the stage of idea generation. Using external designers and implementing "creativity sessions led by external consultants" (Impex) enhance the stimulation of internal creativity by the "implementation of a creative dialog", with "exchanges between external fellow-designers on creative proposals and roughs" (Airbus Corporate Jet Center). Working "with smaller external firms" (EDF) enables the optimization of the exploratory stages, and bring in "some creative freshness" (Bel'M) as long as a "more neutral innovative point of view" (Impex). This approach also enables to "get around the technico-industrial constraints", sometimes heavily felt by the internal design team and thus limiting its creativity (Faurecia). Our results then confirm the benefits of a greater collaboration between internal & external designers for the company's creativity and innovation (Dell'Era & Verganti, 2009; Munsch, 2004).

TOWARD A BRAND DESIGN MANAGEMENT APPROACH?

For the interviewed sample, the contributions of design to brand management are clear:

- First, through the declared importance of the internal monitoring of brand concept creation and brand equity management,
- And also for its crucial role in the new products development process, made tangible on the long-term via the brand codes & invariants and expressed by breakthrough products design.

On the one hand, this strategic brand management could be enhanced, according to many design managers, by a "greater collaboration between the marketing & design divisions". On the other hand, results show that, in fact, many tools have already been developed by the various design teams in the studied companies. Except some companies that do only rely on the traditional tools, such as the moodboard (Bel'M) or the simple oral transmission of the brand codes (Fabrica), most of the studied firms did implement structured and evaluated design tools, like the Colour Code Book at Mc Donald's. Those tools aim at enhancing the legitimacy of the design approach. They also enable the internal reading and appropriation of the brand and help in the development of a brand DNA platform. In this view, beyond the usual design scanning, the studied firms favour the creation of internal books (Seb Group), guidelines and trend boards (Manitou) to formally express the design attributes of the brand (brand values, promises, and logo) and summarize contributions of market surveys (brand use and perception) (Hager Security, Oxo, Oxylane). In a Brand Design Perspective, those tools emphasize the marketing positioning & differentiation, both enabled by the design of the brand & its products (Seb Group, Salomon). They also ensure the brand homogeneity on the long run.

It appears that many design teams are more focused on the strategic dimensions of brand management, which must be internally monitored – and that they tend to drop the tactical and operational dimensions of brand architecture to the marketing team or to external design agencies. If the design team is frequently involved in developing sensory and experiential dimensions for the product and its packaging, it comes out that designers are less often associated to the analysis of customer's holistic experience with the brand. Nonetheless, the EDF design manager stated that the design division is involved in the reflection on "services scenario, concerning the information to handle and the role of people, in order to enhance the service's physical attributes and its delivery to the consumer".

It was also possible to note the positive contributions of design, in the verbatim texts gathered, to the long-term brand equity management, via the renovation of the brand aesthetic codes (Cidetoys, Fiskars, Renault, Manitou) and the permanent adjustment of the brand framework (Salomon, Philips, Renault, Maped). Our results then partially confirm those of Montaña et al. (2007).

A COLOR CODE BOOK TO SHARE BRAND VALUES AND TO JUSTIFY AN UPMARKET MOVE

Mc Donald's has just initiated a deep renovation of its colour codes and of the design of the restaurants (cf. pictures of the Northampton restaurant before and after the change). The company has worked on communicating, both externally and internally, on the reasons driving the necessary renovation of the brand identity and the concerned domains of application.

Figure 1 Northampton restaurant before (left) and after (right) the redesign & Mc Donald's Colour Code Book
Source: Mc Donald's

The approach both addresses pedagogical dimensions and the preservation of the brand identity. From a relational point of view, it was necessary to develop an adapted argument to explain the reasons of such a radical change to all the actors, and especially to the restaurant owners, as it implies huge investments for franchisees.

The colour codes guidelines book first present the origins of the brand, in terms of brand signs and sensory elements. It then develops on the current changes and evolutions to come. The key idea of this new approach is based on the fact that a sensory glance is much more effective than a disordered posture. In fact, previous signs were way too present and the brand discourse was saturated. This tool has had an important internal impact, as it enabled the sharing of the brand's new structure, by expressing it through a simple medium, easy to apprehend and to touch.

EVALUATING OF THE IMPACT OF DESIGN

The discourses analyzed underline the rise in processes of evaluation that design teams have to face. Interestingly, the tools and KPIs used are extremely different, according to the implemented design organization. Very often, these indicators are marketing, sales or process- based. The main difference lies in the mix that is made.

According to Verganti (2009), design-oriented innovation enhances, *in fine*, the value offered on the market, both for the consumer and the stakeholder. The investments made on design reinforce the competitive advantage of the firm and of its key resources, by an improved brand management and a higher consumer loyalty. A brand design approach may then lead to increased profits for the company. Nonetheless, it needs a precise analysis of the contributions of design to firm's operations (marketing, sales, and finance).

In practice, the analysis of the verbatim texts underlines a growing evaluation of design and of its contributions to the company and its brands. Even if some companies still do not use any specific indicators to evaluate design, eg. Cidetoys bases its evaluation on "blurry criteria" & EDF informally evaluates design, we can still observe, similarly to Verganti (2009), that companies evaluate design on the basis of:

- Market-oriented criteria : pre-tests on lead users (Salomon, A. Bonnet) or internal clients (Airbus), consumer surveys, brand image surveys to evaluate the DET[*] (Renault) or to limit the influence of salespeople (Maped), press coverage (Airbus, Fabrica, Renault), impact on the design bodies (Observeur du Design for Fiskars, Janus de l'Industrie for Impex).
- Sales-oriented criteria: market reaction (Fiskars, Hager), sales volume and impact on turnover & profitability (Airbus, Bel'M, Faurecia), salespeople perception and evaluation (Hager Security).
- Key Process Indicators-oriented (Fabrica, Manitou) or finance-oriented criteria, such as the ROI (Salomon).

However, results highlight that companies do not always use the whole set of indicators to extensively evaluate the contributions of design. Depending on the business area in which they operate, they tend to focus either on marketing or financial indicators. Indeed, Renault's DET is mainly based on the evaluation of the design contributions to the brand (brand awareness and long-term image). In the end, results underline the complexity of evaluating design and its benefits for the business. Moreover, they question the dimension of its intangible valuation for the company

CONCLUSION AND IMPLICATIONS

To conclude, this paper contributes to the academic research on Brand Design Management and to the empirical works related to design contributions within organizations. This work shows that while there is a greater integration of the design function in French companies, the current collaborations between the marketing and design teams are not optimal. From a managerial standpoint, some tactical branding issues are still outsourced to various external design companies. We would then recommend a global and holistic brand-design approach, to develop a more pertinent brand experience. Our results also underline the different strategies that the studied companies have, as regards the design function, its organization and the way it will be evaluated. Here, we would advise firms to pay more attention to the designer legitimacy within the organization. We would equally recommend the establishment of hybrid teams to

[*] *The Design Entry Ticket (DET) at Renault: The car marker has developed a mixed indicator to evaluate design. This indicator is made of 3 elements :*

- *First, the evaluation of Renault's Brand Image : design is acknowledged as playing a crucial role in the implementation of the brand identity and in creating the brand image in customers' mind,*
- *Second, the press evaluation of the new products,*
- *Third, the marketing surveys with a focus on customers' evaluations.*

enhance creativity and innovation. Yet, this research suffers from several limitations: First, most of the studied companies are French. Further studies should then be conducted in different cultures and on various firms. Second, it would be pertinent to interview the marketing and R&D teams collaborating with designers, in order to compare their discourses with the designers' declarations and put those in perspective with their counterparts' evaluations.

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APPENDICES

Appendix 1 : Company Sample

Company	Respondent	Business Area
Airbus Corporate Jet Center	Sylvain Mariat	Planes
Alstom	Xavier Allard	Transportation
Amer Sports	Philippe Besnard	Sport s Apparel
Arthur Bonnet	Marc Moreau	Kitchen
Balsamic	Giacomo Peldi Guilizzoni	Interface
Bayer Materials Science	Ralph Schneider	Material Specialist
Bel'm	Anthony Durand	Door Specialist
Cidetoys	François Marcelin	Toys Maker
Cordescourant	Thomas Buisson	Ropes Maker
Dorel	Yann Naslain	Bicycle & baby products
EDF	Gilles Rougon	Energy
Erard	Patrick Bonnemere	Audio-Visual Equipment
Fabrica	Sam Baron	Benetton's Creative Team
Faurecia	Nicolas Pegorier	Car engineering
Fiskars	Emmanuel Rado	Equipment
Accor Group	Michel Gicquel	Hospitality
Casino Group	Aurélie Ladeuix Thibault de Pompery	Retailer
Seb Group	Stéphane Thirouin	Household appliances
Hager Security	Jean-Yves Bournique	Security, Alarms
IKEA	Jean-Yves Massé	Furniture & Decor
Impex	Marine Sibellas	Car accessories
Irisbus Iveco	Thierry Sauvaget	Transportation
Legrand	Pierre-Yves Panis	Electric & Information Systems
Manitou	Thierry Lehmann	Handling Items
Maped	Daniel Racamier	School Accessories
Mastrad	Elodie Brisset	Cooking utensils
Mc Donald's	Eric Bourgeois	Fast Food
Orange	Clément Bataille	Telephony
Oxylane	Arnauld Blanck	Sports
Oxylane – Artengo	Simon Hadjidimoff	Sports
Oxo	Alex Lee	Cooking utensils
Philips	Jean-Marie Bourel	Electronic, Medical Equipment & Lighting
Porsche Design Studio	Roland Heiler	Design Studio of the Porsche Brand
Quick	Quick	Fast-Food
Renault LQC	Patrick le Quément	Transportation
Saunier-Duval	Vincent Picasso	Furnaces
TCL	Gérard Vergneau	Electronics

Appendix 2 : Agency Sample

Agency	Respondent	Business Area
Dici design	Thiphaine Igigabel	Consulting Agency
Graphic Identité	Tomas Ahrens	Consulting Agency
Kiska Design	Gerald Kiska	Consulting Agency
MBD Design	Vincent Créance	Consulting Agency
Logic Design	Jérôme Lanoy	Consulting Agency
Moswo	Arno Lebrunet	Consulting Agency
User Studio	Matthew Marino	Consulting Agency

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Marsden, J. and Thomas, B. (2012). *Brand Expression: Exploring the Visual Communication Strategies of Corporate Brand Marks.*

BRAND EXPRESSION: EXPLORING THE VISUAL COMMUNICATION STRATEGIES OF CORPORATE BRAND

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Whilst the academic discussion on corporate brand identity has increased over the past 20 years, relatively little attention has been directed towards the theoretical development of corporate brand marks—commonly referred to as logos. Following a brief survey of literature, a conceptual framework for capturing the various visual expressions is proposed. Following an explication of the constructs, the application of the framework—through secondary research and archival data—is described and its effectiveness is reviewed.

Keywords: Corporate Identity; Brand Identity; Visual Identity

INTRODUCTION

Corporate brand identity has received a great deal of attention over the past 40 years. From its rudimentary roots in graphic design, through notable designers such as Paul Rand and Saul Bass, where the preoccupation was on visual consistency, the scope of activities undertaken in a brand identity programme has changed significantly. Today's identity programmes are increasingly multidisciplinary in nature, extending far beyond the remit of designing consistent visual manifestations. With this pronounced complexity there has been a shift in the providers of identity council, where multidisciplinary consultancies were keen to distance their offerings away from being perceived as 'logo merchants' (Schultz, Antorini and Csaba, 2005: 33). As the emphasis became less about the functional aspects of brand identity and increasingly focussed on the more strategic aspects of brand management (Allen and Simmons, 2003), academic research followed accordingly.

Previous research has predominantly been concerned with gaining greater understanding into the effective management of brands. The key branding issues of brand strategy, brand architecture, brand alignment and brand evaluation are crucial activities in the effective management of brands, and have therefore received significant theoretical development. However, the area of corporate brand management that has been somewhat academically neglected is the theoretical development of the visual communication strategies of corporate brand marks.

As the most visible of corporate devices, the brand mark has been noted as having the ability to convey the corporate personality, the corporate vision, organizational values, the organizational mission, even a "big idea" (Olins, 1978; Balmer and Soenen, 1999; Abratt, 1989; Jones, 2001). However, there appears to be a lack of empirical research into how such organizational traits are incorporated into the brand mark. Whereas product brand identities typically express aspects of the product, such as a distinctive point-of-difference, through the articulation of functional benefits, emotional benefits, or self-expressive benefits (Aaker, 1996), corporate brands are intangible and

have greater complexity. This paper, therefore, makes a tentative step towards the exploration of the “dark art” of corporate expressions, focussing on the principal visual manifestation: the brand mark.

BACKGROUND

Symbols can be very powerful communication tools. The power is derived from their ability to convey a lot of meaning with very little apparatus. ‘Maximum meaning, minimum means’ as Abram Games so succinctly put it (Games, Moriarty and Rose, 2003). A good brand mark ignites the short-term memory, ‘without the need for a long exposition on the company and what it has to offer’ and therefore ‘reduces the redundancy in communication to a minimum’ (Van Riel, 1995: 39). However, building such a powerful, immediate and communicative brand mark is immensely challenging.

Whereas a product brand would aim to express a distinctive point-of-difference (see Blackett and Denton, 1992), a corporate brand is more broadly defined, which makes the task of communicating something both compelling and meaningful about an organisation more challenging (Keller and Richey, 2006). In the formative years of corporate identity—1950s and the 1970s—there was an inherent belief that the conceptual development of a brand mark should capture an aspect of organisational personality. According to the late Paul Rand, one of the “grandfathers” of corporate design, a visual identity ‘should embody the essential characteristics of an organisation’ (Heller, 1999). This approach reflected the view that corporate identity was an identificational tool that revealed the corporate personality through consistent, professional design (Bos and Henrion, 1990).

THE EXPRESSION OF PERSONALITY

In the early years of the twentieth century many large organisations were led by visionary statesmen, such as Walter Rathenau of German electrical company AEG, whose energy and personality directly influenced the culture of the organisation. Therefore the personality of the organisation was, essentially, a direct extension of the founder or chief executive officer’s personality (Olins, 1978). This could be seen in Terence Conran’s Habitat, and can still be seen in Richard Branson’s Virgin brand. In such cases the task of encapsulating and articulating an apparent corporate personality would appear a somewhat more coherent procedure.

Not all large organisations, however, are run by leaders whose personalities permeate the culture of their organisations in such an influential way. Not all leaders’ personalities are appealing, or warm, or friendly—the kind of qualities that organisations wish to be seen as having (Margulies, 1977). Equally, the leaders who are charismatic and appealing might choose to leave or retire, which results in a scenario that Olins has termed ‘the personality deficit’ (Olins, 1978). The cultivation of such appealing personal attributes would go some way toward achieving a favourable corporate culture, no doubt, but unless it was genuine there would be risk of misalignment between the identity and image interface.

Indeed, the intention of early corporate identity pioneers such as Paul Rand, Walter Margulies and Walter Landor, was to focus on revelation rather than conjecture, which demonstrated a concern for expressing truths. ‘Corporate identity exists with or without a corporate identity programme. Every company has an identity. A design consultancy doesn’t create it. What a design consultancy can do is help the company articulate it’ (Bernstein, 2002). The challenge for design consultancies was in finding a link between what the organisation had in its personality arsenal that would appeal to key audiences.

THE EXPRESSION OF VALUES

The personification of organisational identity through the expression of a leader’s principles, however, is not always suitable or indeed possible. Often a collective of tacit guiding principles are uncovered and used to inform the organisational expression; and sometimes such values are

cultivated from the beginning of incorporation. This can be seen in cases such as Orange where organisational personality was articulated through organisational values. Indeed the entire brand identity 'grew from a set of values that become the basis not only of its mark but also its services, communications, environments, and employee attitude' (Hamilton and Kirby, 1999: 41).

Since organizational values, explicit or otherwise, permeate and inform aspects of organizational behavior, it would seem that they are a valid platform to inform the expression of organizational personality. Collins and Porras (1996: 67) refer to organizational values as 'a company's essential tenets', and Gad (2001) refers to them as 'rules of life'. The problem, however, in expressing such traits through a visual identity is that organizations tend to use similar 'cookie-cutter' values, and consequently offer limited scope for differentiation (Lencioni, 2002).

Expressing values, whether an individual's or a collective, is not always the only choice of expression. Whilst IBM's visual identity was claimed to be a projection of organizational personality, the descriptive abbreviation received little attention in terms of its expressive attributes. Sure, the straightforward, matter-of-fact nomenclature may project a certain sense of character, but it also functioned as a signifier of core activity—something other than personality. The expression of capabilities was a consideration in the rebranding of the UPS identity and the reason for a change, as the symbol 'no longer fully expressed the company's capabilities' (Bloomenkranz, 2004: 69). It is apparent that many identities express this feature yet it appears to be given little consideration in the literature.

THE EXPRESSION OF VISION

A significant limitation of conveying core activities, of course, is that activities can change. Vision, by contrast, offers longevity—a worthy condition in organizational identity. A glance at many of the large consultancy case studies reveal a vision-orientated approach to identity design, which would support the findings from a study conducted by Balmer and Soenen (1999). "Vision" as a construct, however, is used to mean different things: in some instances it is used to convey a specific, envisaged long-term goals, such as BP's reference to moving "beyond petroleum", whereas in other instances it has been used to convey an aspiration to attain generic organisational performance, such as Amazon's "customer satisfaction".

The expression of vision, however, appears to be susceptible to the same weaknesses as the expression of core values, in that many organisations converge at a similar set of words (Jones, 2001). Instead Jones proposes something 'more substantial than vision' and suggests the unearthing of a 'big idea'. Whilst there is resonance in this approach it is less clear how the big idea is mutually exclusive from the vision.

Clearly the range propositions, discussed above, relate to the totality of organisation identity and are not limited to the singular brand mark. Nevertheless, the design of the brand mark is typically informed by one of the strategic considerations of vision, values, activity, etc. However, it is apparent from a survey of the literature that a conceptual framework for the design of a brand mark does not exist. As such the following section describes how the four statements provided by Olins (1995) were used to initiate the development of a conceptual framework to capture such activity.

OPERATIONALIZING THE CONCEPTUAL FRAMEWORK

The use of a prior conceptual framework has the potential to introduce preconceived ideas to the analysis of data, constraining the researcher's perspective to only view the data through a predetermined model, and therefore hinder the natural emergence of theory (Glaser and Strauss, 1967). This could be considered somewhat problematic for an emergent research design such as this one. However the authors share the view of Dey (1999) that, rather than prior knowledge being a hindrance, it can offer a useful frame for the analysis, providing that the process remains inductive and that any irregularities are allowed to emerge from the data. Dey refers to this as 'not confusing an empty head with an open mind' (1999: 229). Theory is not a fixed arrangement of concepts but an 'evolving and adaptable relationship of concepts' (Dey, 1999: 30–31).

With reference to Olins' notion of corporate identity as 'business strategy made visible through design' (1989) the framework was based on Olins' view that corporate identity could communicate four ideas: 'Who you are, what you do, how you do it, and where you are heading' (1995: 3). These four ideas, however, were not presented as a tool for orchestrating the visual manifestations, but as a framework that encompassed the broader scope of the corporate identity domain. As such, the framework was implicitly offered as a platform for practitioners to consider the articulation of organizational strategy through the mechanism of corporate identity. Whilst the framework was clearly informed by Olins' vast experience, no exposition of the constructs was provided.

Nevertheless despite this limitation the framework offered a suitable starting point for mapping the visual expressions of organisational brand marks. The strength of the four "pivots" was that they provided an explicit mechanism for encompassing the possible explanations of corporate identity. However these concepts lacked the required specificity and robust categorical definitions necessary for them to facilitate research. Nevertheless these four "pivots" presented an opportunity from which to explicate the constructs to form explicit and specific indicators (Glaser and Stauss, 1978, cited in Locke, 2001). These are outlined below.

THE CODING SCHEMA

Pivot 1: Who you are. All visual identities signify an organisation. At a functional level a visual identity operates as an identificational device, and therefore, through the merit of design—or lack of it, such devices provide a level of recognition. Therefore the "who" pivot is a default category as it applies to all identities. In addition to the basic function of identification, this pivot can suggest either ownership and/or origin through the use of place names or family names.

Pivot 2: What you do. This pivot referred to visual identities that communicate, either through explicit description or subtle suggestion, the industry or core activity of the organisation. The expressions of this pivot have to be explicit, without the need for prior, specific knowledge of the organisation in question. There are two types of mechanisms used to signify this pivot. The first is the use of descriptive nomenclature that makes a direct reference to the primary operational function of the organisation, such as British Airways. The second type fulfils the same role but makes use of recognisable symbols associated with a specific category of operations or industry, such as the use of a cross as a signifier of the medical industry. An example of this would be the subtle typographic arrangement of the cross in the identity for Bayer.

Pivot 3: How you do it. This pivot alluded to the manner in which an organisation conducts itself, and therefore appeared to relate to the values that underpin and inform the behaviour or personality of an organisation. This pivot can also refer to a point-of-difference or a competitive advantage of an organisation by revealing an aspect that might aid distinction from an organisation's competitors in the sense of positioning within the marketplace. Accordingly the "how" pivot can be articulated through core values or referred to as differentiation. The difficulty here, however, is that all letterforms—and therefore logotypes—have intrinsic communicative values, and therefore could be considered as markers of attitude; colour also invites the same problem. Given the difficulty of isolating such complex variables the following rule was incorporated: the "how" pivot should only be acknowledged if the meaning is clearly apparent, and with an acceptable level of explicitness. There are three devices used to express this pivot. The first is through the use of suggestive nomenclature to articulate a distinct position, which could be an operational advantage or superior service, for instance. First Direct would be an example of such a device. The second type is the use of a suggestive symbol, which could convey a distinct position relating to an operational advantage or superior service. An example would be the crown symbol in the Hallmark identity. The third type of device relates to the graphical attributes used as a means of expressing differentiation, core values, or a particular attitude. An example would be the flamboyant letter-style of the Saks identity.

Pivot 4: Where you are heading. This pivot appeared to refer to the organisational direction and therefore related to the vision—or aspirations—of an organisation. The expression of this pivot could be distinguished as specific or unspecific: A specific "where" pivot would relate to a distinct

destination, such as the clean energy references in the petroleum-energy sector. An example would be the symbolic reference to the sun in several of the brands from this sector. An unspecific “where” pivot, by contrast, would be a generic reference to the future—or a generic signifier of progress— such as the use of right-facing graphic devices. There are three types of such devices: The first would be the use of a suggestive name that articulated a future direction or an aspiration of an organisation. The second type is the use of suggestive symbols to articulate a specific future direction or aspiration. The third type is the use of generic graphical devices that simply provide a “nod” to progress. Such graphic devices would typically be facing, moving or situated to the right used as a semiotic code to signify “progress”.

As previously indicated, by using a prior framework there was an intrinsic risk of ‘forcing the data to fit’ the model (Charmaz, 2006: 49). To mitigate this risk a fifth category was incorporated into the framework to accommodate any expression that fell outside the boundary criteria for the four pivots. Since this “other” category was merely a mechanism for capturing nonstandard expressions, there was no need for a description of the boundary conditions.

RELIABILITY OF THE FRAMEWORK

A measure of inter-coder reliability was conducted with the help of a colleague from the School of Design in the University of Leeds, UK. Before the commencement of coding the second coder was provided with a brief introduction to the boundary descriptions, along with a set of additional examples to aid the coding process. In following best practice, the exemplars used to illustrate the coding scheme consisted of cases from outside of the study, so as to preserve objectivity (Neuendorf, 2002). After the brief description of task, the second coder was asked to select five random [face down] cases from each of the five decades, compiling a total of 25 cases. Upon completion of the task a comparison of the results between both coders could be compared.

In terms of the level of agreement between the two coders, the reliability showed to be 0·93 in percentage agreement. However a further measure was conducted using Cohen’s kappa coefficient, which takes into account the chance occurrence of agreement. The result was a Kappa of 0·86, which, according to Krippendorff (2004) and Neuendorf (2002), falls within the threshold of being deemed highly reliable.

METHOD

In order to capture the maximum variation of expressions, cases were sought from over a large period of time: from the 1960s—a period when the cases of corporate identity, as it used to be known, reached critical mass—through to the 2000s. The number of cases sampled from each decade was determined by the decade with the lowest sampling frame, which was the 1970s. Accordingly this limitation imposed a realistic sample of 20, which resulted in the accumulation of 20 cases from each of the five decades.

As a further means of enabling a wide range of expressions to emerge it was essential that a diverse range of sectors were represented in the sample (although some of the more profitable and high growth sectors that engaged in such activity occurred more frequently, perhaps due to their capacity to invest in such undertakings). Three constraints were imposed upon the sampling design. Firstly each case must be considered as a corporate brand, as opposed to a product brand. Admittedly whilst the two are not necessarily mutually exclusive, there are distinct differences, as noted by Hatch and Schultz (2001) and Balmer and Soenen (1999). Secondly the identities had to be visually independent and therefore free of any endorsement by a parent organization. This criterion enabled a greater clarity of analysis without the unnecessary introduction of additional considerations. The third criterion was that each case must have received “credible” design intervention. The assumption here is that by considering only the cases by “credible’” designers—track record, reputation, etc—the work can be considered as representative of best practice, in terms of its communicative value.

For the cases that satisfied these criteria archival data were gathered from large specialist brand consultancies, corporate identity literature, and from the LexisNexis database. The subsequent material—encompassing collected papers, case studies and press releases for each of the 100 cases—was subsequently subjected to a content analysis to determine the explicit intentions of the design expressions.

ANALYSIS

Given the intentions of the study the unit of analysis extended beyond singular words as these alone would not reveal sufficient clarity of meaning. Whilst a list of reoccurring keywords were used to signify thematic proximity, it was imperative for the unit of analysis to include the context of the keywords, as these larger semantic units, such as clauses and sentences, better enabled a more accurate interpretation (Bliss, Monk, and Ogborn, 1983, cited in Miles and Huberman, 1994). The most revealing and meaningful semantic units were highlighted and coded in accordance with the conceptual framework. A table of thematic indicators and their corresponding pivot, along with an example of the usage is provided in Table 1.

The objective of the content analysis, in addition to determining the intentions of the design expression, was to identify the presence of the four pivots from the conceptual framework. Equally important was the discovery of emerging points of theoretical interest and the potential occurrence of outliers—the deviant cases that the conceptual framework could not accommodate.

Table 1 Thematic indicators and their corresponding pivot.

Pivot	**Extracts from cases**	**Keywords/constructs**
Who	*The idea of the red O came about partly to reinforce a design concept to use circular canopies, pumps, and display elements for a* ***distinctive*** *and* ***attractive*** *look. It also served to help people* ***pronounce the name correctly*** *(Mo-bil, not Mo-bile), and, of course, to add a single* ***memorable and distinctive element*** *to an otherwise very simple lettering style.*	Functional considerations of the visual identity. • Aid pronunciation • Attractive • Consistency • Identificational • Memorable • Recognisable • Uniform
What	*Rand's challenge was to transform the shield into a modern image. He streamlined the contours, introduced balanced gothic lower case letters,* ***and placed an outline of a package with a bow on the top of the shield as sort of a crown.*** *The new identity conveys BT's focus****, the human communications business****, with a symbol that can be understood across national borders.*	Explicit references to the literal or metaphorical visual manifestations that signify core organisational activities. Less specificity in categorical descriptions, movement to higher substantive categories: from telecommunications to human communications.
How	***Our new identity is a symbol for all that is best in customer service. The ideas of service, fidelity and promptness suggested the notion of a dog retrieving a ball …*** ***The new identity needed to express the EIB's values*** *and proactive approach to economic and monetary union …* *Embedded within the primary design is an arrow****, symbolizing the company's speed and efficiency.***	Emphasis directed towards performance signifiers. • Values • Differentiation • Point-of-difference
Where	***The globe, of course, is a commonplace among logotypes these days when every corporation aspires to be a "global corporation".*** ***The final design symbolized the American landscape – woven from our diverse heritage … The symbol was both American flag and arrow to the future.***	Explicit reference to a generic global aspiration. Keyword: global. Right-facing devices as signifiers of a progress-orientated organisation.

FINDINGS

From the sample of cases (n=100), the framework could accommodate 96 per cent of the cases sampled. However it became apparent that four of the cases had expressions that extended beyond the four boundary descriptions of the framework. In all of the cases the organizations were diversified, which intrinsically posed a more challenging set of communication problems.

In three of the outlier cases the key expression focused on the benefit of the collective activities of the organizations. For instance, Diageo—a holding group consisting of a portfolio of beverage brands—had an expression that centered on the idea of 'pleasure'; whilst Smith & Nephew—a supplier of medical devices—had an expression that focused on the idea of 'getting people back on their feet'; similarly Unilever—the owner of many FMCG product brands—emphasized the idea of 'vitality'.

The remaining deviant case for Fortis (designed in 1998) was intended to express a plan view of a heterogeneous town, to represent the organizations diverse financial offerings to meet the needs of a range of people. This message was neither a signifier of activity nor an expression of their aspiration. As this expression suggested a 'range' of products, it could be considered as a partial reference to the "how" pivot. Similarly, the symbol apparently was a reference to a skydiver's vantage point, and therefore made suggested a superior viewpoint, which implied an operational advantage. However the implicit nature of the device made the classification more difficult.

DISCUSSION

It became apparent from the reliability of the framework (*K*0·86) and its ability to capture the expressions of the majority of the cases sampled (96 per cent) that it was an effective tool for analyzing the expressions of corporate brand marks. Nevertheless the application of the framework signaled some necessary modifications. Firstly the boundary description of the "how" pivot is in need of a more robust treatment, as this category contained the more subjective elements such as the tone-of-voice of typography.

Similarly the framework could be applied to a larger sample of cases, and perhaps incorporate a semiotic analysis corresponding with the boundary descriptions to enable the application of the framework to cases with insufficient explanatory documentation. The concern with this methodological development, however, would be the likely disjoint between intention and interpretation. Nevertheless this supplementary method could yield an interesting perspective and serve as an additional means of data triangulation.

The preliminary findings from this study provide a suitable point of departure for a subsequent enquiry that seeks to locate the visual expressions of corporate brand marks into a theoretical framework. These initial developments attempt to address the limitations in the literature regarding the embedding of organizational strategies into visual manifestations of corporate brand identities. Ultimately this project intends to develop a fully operational tool that should be of theoretical interest for academics and of use for practitioners to improve the understanding of this under-explored domain of brand management.

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ABOUT PRODUCTS AND THE DESIGN PROCESS: AN HISTORICAL APPROACH ON DESIGN AND AUTHORSHIP

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The products of the design process are much too different and seem to have little in common, but essentially, no matter how they are built, all of them have at least two key features that lay a common ground: they are products of a design process and they all bring symbolic values which may lead them to different uses, or even give them new meanings, depending on the niche of society they communicate with.
Addressing some insights into the field of Design, a historical overview of the design culture, the concepts of communication (Bakhtin) and the concept of "author function" (Foucault), we discuss the places of authorship in the Design process, taking into account the products as isolated events in a constantly developing cycle.

Keywords: Epistemology; Authorship; Design process

INTRODUCTION

This paper presents an essay that aims to analyze some aspects of the work of design nowadays. To this end, we will focus on the relation between technique, creation, design, management and authorship. The epistemological tension of design as a field taken by the technique and the creation is the axis of our thinking.

The grounds for our argument – the main question this article tries to answer - is related to the work of the designer represented as a product that is fruit of a design process with historical and contextual bias. Normally, the professional transforms existing objects in a determined ecology, through the technique and the design process, in preferred objects - objects that become tools for thinking, tools that mobilize actions that change the relationship between man and space, affecting construction of daily routines, from the mundane tasks to the work management. Clear examples are the visual metaphors represented by digital interfaces so present in our cultural repertoire today or even the natural attitudes aroused when one is facing a screen (if years ago one would only expect a screen to present a visual content, today the user will try touching the screen expecting for a visual response to a physical stimulus). Creating a new culture of communication based on the shift of functions fulfilled by mobile devices is a great and contemporary example. Ten years ago, those devices would be bought only for its portable phone qualities (so, the best device would be the smaller artifact from which one could still make phone calls). Nowaday the consumer expects more from a mobile device: the smartphones allow the users to carry and modify personal and work files, to write down ideas, to schedule appointments and to contact others by email, messages, chats and phone calls. This shows the change in the "horizons of expectations" (Jauss) related to this kind of objects, resulting in the generation of a new culture related to uses and possibilities of such artifacts. But are these uses and possibilities really new or are they new to that kind of product?

Developing these tools is a true reinterpretation of existing artifacts. The design process, creative in his plot, transgresses the ordinary uses of existing objects, to deliver a new object, or better, to become instruments, brands, interfaces, products. The author's name (in the sense given by Foucault (2001) in his paper entitled "What is an Author?") is precisely associated with the outline of a reference field after the exercise of intellectual and artistic work. In this case, the name of the designer or producer of the object is often a reference guide that brings clues by which the user can understand the product invented in the creative design process. The author's name would be the end of the process. It would be the name that gives meaning and reference to the project. This name brings together objects from the past and present related to it, creating a web of meanings that enables a prior understanding of the artifact, thus creating a horizon of expectations for it.

In this sense, the historical and diachronic aspect of Bakhtin's philosophy of language has proven crucial to understand this dynamic. Thus, we will take into account also Bakhtin’s theories on collective authorship, to show how the creation is intrinsically linked to the reinterpretation of the senses that cross us in our times. This will help us think about how the creation of the design is in constant dialogue with its time, since the creation in this field is often the result of re-creations of objects, producing new meanings and uses for these. The design produces important tools for job performance nowadays, as their projects require specific skills and abilities from its users. Hence, the designer creates tools and, by creating them, reinvents object functions.

We understand that the dialogue between authors from different areas (Linguistics, Communication, Psychology, Philosophy) and the field of Design themed by a diachronic historical understanding of the design process opens new places for discussion. It also allows us to build new understandings on a practice based on constant research (survey data, case studies), trial/experiment (induction of contexts researched) and innovation associated to the concept of reframing and user experience rather than the concept of "new", “original”. The discussion here proposed creates links between the practice of design and concepts rarely used by designers. Such links allow new insights to feed not just Design theory - as it allows new possibilities as a result of the encounter between different fields of knowledge - but also and especially the Design practice - by building and exercising a hypothesis that can substantiate the speech of advisors/teachers/lecturers (in Design courses), creative team leaders and active designers. Addressing some insights into the field of Design (Couto, Love, Bomfim), a historical overview of the design culture of Argan, the concepts of communication created by Bakhtin and the concept of "author function" created by Foucault, we discuss the places of authorship in Design projects, taking into account the products as isolated events in a constantly developing cycle.

DESIGN PROCESS AND CULTURE

The designer produces artifacts that fall within the social fabric, creating categories. His creations become relevant when used, creating new values in interaction with other objects. In the development of his work he combines symbolic elements of the target community, decoding and rearranging these elements in the form of different discourses. Thus, the designer proposes new meanings for the elements combined. One can therefore say that the designer is a professional capable of using languages and generate utterances for each production.

In the world, the designer acts as a builder of speeches by assembling different languages – verbal texts, symbolic objects, visual language, images, among others - for different purposes. The products of the design process can be an interface for digital content, a line of shirts, a car, a chair. Such itens seem to have little in common, but essentially, no matter how they are physically or virtually built, all of them have at least two key features that lay a common ground: they are products of a design process and they all bring symbolic values which may lead them to different uses, or even give them new meanings, depending on the niche of society they communicate with. We can state the design process creates symbolic value. It designs tools for thinking, working and living, from previously used objects.

In the design process, different languages converge, so the professional is able to translate information/symbolic values for specific audience. The design product (either physical or graphical) brings within it the indications on how it should be used and what it should be applied to. However, different uses and purposes for the design product may arise, due to the historical and social context in which it exists, as well as a result of the product interaction with a myriad of other objects. Entities such as signs are part of our expression and play key roles in our everyday life communication. In personal spaces (like home, for instance), an individual makes decisions that shape the space in order to reflect his own values. As such, the designer's work builds values that can shape as well as change the environment in which men live and work.

From this perspective, Bakhtin's dialectic point of view on the discourse mechanics proves to be fundamental to the practice of design. As a developer of pieces/signs/entities that will add to the communicative fabric of society, the designer must be supported by a theoretical foundation in order to understand the dynamics of social interaction. The result of each project will be an element of the discourse being articulated by the group which it is addressed to. The design process, whenever developed from the observation and analysis of discourses and practices of the social groups it is addressed to, is likely to improve its understanding of how objects influence the culture.

As Nietzsche reminds us, the human being is the animal that sets values. Therefore, the language that characterizes us as humans is the tool that evaluates our actions and artifacts and tools that run through our culture. The culture is intrinsically linked to the value - from its etymological roots tied to agriculture, cultivation, till the mass culture associated with the consumption (Eagleton, 2005; Guattari & Rolnik, 2007). Objects (being them objects of thought, artifacts or tools) transform our way of thinking and, therefore, influence the culture.

Design products can be grouped by types, and each category brings "horizons of expectations" (Jauss) within its qualities and user reception, based on similarities. The products shapes and uses must be planned not to meet only one idealized shape or use, but the possibilities that unfold from its use, so that the artifact can bring within it information to allow a fluent interaction with the public (Krippendorf, 1986). In understanding this dynamic and adding it to the process, the designer will not only be able to develop a product, but also understand the reasons that make it the way it is, always looking for the evolution of the product. The artifacts are nodes of an intricate network that link themselves by function similarity, associated symbolic values and provenance regarding the production or authorship. But at first glance, the potential user tends to look at the object or interface features, in search of a meaning given by signs in order to (a) produce an initial understanding on the use and function, (b) categorize the product, (c) create horizons of expectations, comparing with conceptual similar objects (in terms of possible function or environment in which it is proposed to be used) to finally (d) make sense of the object. The knowledge built from the discourse analysis guides the designer through a conscious practice and allow him to assess his position in relation to the design process, to the product created and to its context.

This makes Design such a fresh and contemporary field. By assessing both means of production and production itself, by examining context, individuals and objects, the designer connects with both means and end, changing with his creation the same landscape he is researching. Design is associated with both the media and the constant workspaces renewal due to productivity and quality enhancement. Lazzarato (2006), in analyzing the features of contemporary work, says that companies now anticipate product demands. They do so by understanding that marketing is the creator of desire, creating therefore public itself. In contemporary society, marketing has become an ally of the company in its invention of the public (public that may be affected by these dynamics). The Design with its pedagogy of product can be used here as an marketing's ally in understanding people's desires and creating new public. Thus, the design can be used as an mechanism of reflection for knowledge management in enterprises as discussed in our times. But this is only one of its dimensions.

Thus, we must consider the products developed by designers as objects that arise from two strands: a project (a) that requires the creation of an object to perform some functions, and (b) that is feasible in relation to the production, assembly, distribution, circulation, use and disposal of the object. Before we generate a specific product with a certain color, a certain size, a certain texture, some conditions must be considered by the designer: what understanding he must achieve and what message/solutions his creation must carry out. A series of requirements and constraints outlines the product as it is. The designer should think ahead the relevance and the value of designing a product, taking into account:

- usage situations,
- the environments it will belong to,
- market conditions for either success or failure (i.e. solutions that more often end in success or conditions that are likely to lead to failure),
- the mechanisms of legitimation (objective or subjective) to be considered for an analysis of the product,
- the public taste the designer wants to meet (and the public the designer wants to ultimately reach),
- conditions of production, storage and sale, transportation and circulation, and
- the insertion of the object into the symbolic fabric of an age marked by cultural diversity on an interplanetary level and easy access to media.

The above elements lead us to the understanding that, when the designer lists the conditions for a project to start, he creates an opportunity. This opportunity triggers the process of creation and it is the vortex around which will orbit elements relating to:

- a) contemporary customs and traditions considered from a diachronic (historically situated) point of view and addressed as there was a gap (a possibility of acting being a result of it),
- b) context of production: sustainable approach issues and the horizon of social and material technology,
- c) period of research and development: in a culture of convergence, ideas circulate in many ways and context in which opportunities arise may change within a very short period of time. As a result, the project will require a greater repertoire to implement the solutions developed, more research sources on similar cases and greater flexibility in relation to project variables, such as audience, production and horizon of expectations, and
- d) testing period.

Argan (1992) notes that a project, by its transgressive demeanor, is always in progress. Being linked to the ability of making projections, thinking about the past and anticipating an idealized future, the project is a critique on the existence, based on the premise that the designer is able to develop a better response to a question than the responses currently available. In this context, the design work is both critique and analysis of existence. It takes the ecology of existing objects as problematic instance and, therefore, as an engine of reflection and design creation. So the designer uses his imagination to anticipate trends and create the best solution. However, when such idea materializes, it leaves the realm of the ideal future behind and reaches the domain of the real present. By creating an object as a solution, the designer performs (through the design process) a redefinition of the conditions previously considered, as a result of the change in the relationship between individuals and object, allowing them to redefine of each other. In this way, when brought into use, the solution leaves the field of imagination, going to the field of History, suffering then new processes of analysis and criticism, becoming the touchstone for proposals of better (or new) solutions. The design process does not end when a product is ready, but the product, rather, becomes data for the next design process. Hence, this understanding of Design process is in line with the need for renewal, innovation and proliferation of the supply of seasonal products that moves and feeds the industry today (Baxter, 2011).

Hence, we use the philosophy of language to position some concepts. One of the most important elements brought by Bakhtin in his studies regarding the human communication is perhaps his understanding that the meaning tied to each element of discourse changes by the way they are used each time. Appearing throughout his work, the concept that the signs are reinterpreted when put together interacting brings the dynamics as a key element. For the Russian linguist, the forms and uses are not definitive, but mobile, dynamic and multiple, gaining new meanings in its use by various social groups.

In Bakhtin's concept, however, time is not a factor of indeterminacy, but a plan where language and meaning production lie within. In his formulations comprising the understanding that the forms are polysemic and change in the use and time, Bakhtin works exclusively with the relationship between elements that compose a discourse, considering the discourse itself and the context in which it is expressed factors that influence the understand of each sign used in a composition.

Treating language as a dialogical system of signs, Bakhtin sees interaction as a central element of communication, where the meaning production is possible, both for people who build and for those who receive a message. The construction of a message is based on the meanings that signs carry from their social use. Likewise, the choice and use of forms follows a determination of what is meant and to whom you mean.

Who produces the discourse makes use of the repertoire, seeking to address the listener an idealized statement. In such statement, the producer takes in account the significant values he understands and the significant values he thinks his audience should understand. So everything that is reported brings the voices of others – from where the repertoire is built - and is a unique message in time. And what makes it singular is that each message is the result of a unique mix of several influences. On this view, communication is an endless cycle that feeds individuals and is fed from each sentence produced by them.

In society, every formulation is a response to another formulation. Not only by its most accepted meaning, in which one responds to a direct stimulus, but because one always builds a discourse influenced by ideas refuted, ideas questioned, ideas with which one agrees or to which one returns. No communication is inert, created from the complete lack of substance. Everything is a reaction to some form of contact. Citing Argan once again, the Design is constantly critical to the reality where the present is both problematic situation and opportunity for action that will mobilize the designers to generate solutions. These solutions are formulations that once implemented become part of the problematic situation, enabling new formulation.

This constant critique, part of the design process, is related to the epistemology of the field. Cross (1982) believes that the designers have a particular way of achieving their know, which has close relationship with their way of handling theory and practice in their search for a better definition of the problems submitted to them. For Cross, while people in the field of science study an issue using a problem-oriented strategy, searching for a single rule that governs that kind of problem in general terms, people in the field of Design adopt a solution-oriented strategy, focused on developing solutions to for the problem presented. Therefore the agent produces an array of solutions to meet some of the conditions of the situation addressed, instead of looking for an unique response which would bring a solution for all problematic conditions. In other words, the designer generates tentative solutions that help contextualize the problem addressed, always looking forward to the development of even better solutions.

Buchanan (1992) raises a key concept for the field, understanding design as "creative design activity, recreation and evaluation of objects, present in daily life, taking many forms and operating at different levels" (Couto, 1997). According to the author, designers explore concrete integrations to the knowledge that will combine theory and practice with new productive purposes. He organizes the Design production in the following areas: (a) symbolic and visual communications, (b) material objects, (c) activities and organized services and (d) complex systems or environments for living, working, playing, and learning. For Buchanan, the Design thinking brings a systematic

pattern of invention that is not based on the categorization of objects or ideas, but in its placements. This thought, then, allows the designer to develop solutions based not on redesign of an object in the same category, but rather on the use of an entity from another category or nature in order to fullfill the actions needed to solve a problem or to a more accurate definition of the problem. The placement of an object, he says, gives context and direction to thought, but its application as a solution in the new scenario generates a new perception of the issue and provides a new path to be explored. The Design, then, is the field of invention and requalification of values based on the relationship given by the practical result of a theoretical innovation.

Therefore, an ultimate validation does not exist, as the generation of satisfactory solutions only demands small validations. Such solutions, deemed as temporary or tentative, generate new data sets that let the designer refine and/or rebuild hypothesis. The design process focuses on the possibility of extracting data from the tentative solution. As seen with Argan, continuity is therefore a condition for the designer's work.

The authorship of the design work is ephemeral, since the design process is always in progress: from a scenario addressed through a project opportunity, the designer creates satisfactory solutions (products) that change the scenario where he acts, which allows a new opportunity to arise. The universe of objects and subjects within that scenario will then be deemed as new data for a new satisfactory solution.

DESIGN AS THE INTERVENTION ON REALITY AND ON THE WORKSPACE MANAGEMENT

As stated earlier, the design work is connected to the development and continuous testing of tentative solutions. The design as an interdisciplinary field is crossed by concepts, knowledges and practices from several areas of knowledge such as Psychology, Philosophy, Engineering, Mathematics, Marketing, among others. The project, as a critical tool in the Design studies, aims to intervene on reality to reframe and renew existing objects in a given ecology of objects. This movement of reframing by design is widely used in contemporary enterprises. Take the example of cultural change within companies work from simple changes in the relations between workers and their work environment. In order to illustrate the case, we first present an overview of the use of design in the workspace management that truly changed the work culture, thus influencing the ways a person organizes its mindset.

In an article about the relationship between Design and Taylorism, Fordism and Toyotisme, Hilali and Mathieu (2010) show how these concepts enabled the emergence of solutions in labour management. Through a workspace management project, these ideas have transformed the job itself in order to produce a revolution in the industry in the name of productivity.

Taylor was supported by a scientific paradigm and with his analysis built a model of production management based on the design of the work tools. Before Taylor, the worker's labor was only considered from his physical strength. His studies led him to consider other factors such as materials to be worked, the material of the tool, its size and strength of the worker. Bringing together such an intrincated network of factors, Taylor understood the complexity of productive teamwork, by considering more productive to focus on time management, division of the whole process in well defined tasks and higher quality standards. Thus, he inserted in the dynamic analysis of labour management the issue related to the manifestation of the work tool. This design was intended mainly to productive efficiency and took into account elements that today would be easily associated with ergonomic studies of the work.

According to Hilali and Mathieu (2010), Ford added to this issue the question of the proper working space. This way, Ford took into account studies on the architecture of the workspace (namely the factory blueprint). The studies and conceptions of the design work for Ford pointed that with less displacement of workers, productivity would increase for sure. Thus, its ideas address the workspace design from the relations between the factory architecture, the climatic conditions in

which the tasks are executed, the reduction of accident risks and productivity. These four factors are the objects of the Ford's idea on workspace design.

Toyotism is presented as a dialogue between the design tool and workspace design found in the previous two. However, this conception was concerned with the waste noted in traditional industrial production. This way of thinking the workspace bets on a critical assessment of both the production and the product's distribution, from a management model that became known as the five zeros: zero defect parts, zero damage to machinery, zero stock, zero delay and bureaucracy. This model greatly influenced other forms of management based (a) on management methods such as just-in-time and (b) in the consideration given to the cooperative relationship between managers and workers. This way, the workspace management could result in new experiences that had both objective (ie: enhancing the production itself) and subjective (ie: the way people understood their jobs) results, creating a new workspace culture in the process. And as previously stated, because of its contemporary, the Design work is crossed through and adresses the issues raised by the present. And so, let us take the workspace and its relationship with the design in the information society.

Boyle (1996), in "Shamans, Software, & spleens, Law and the construction of the information society", examines the vicissitudes of the information society, pointing out the relationship between information and economy in today's society. He shows how our culture tends to probate information to make it a usable value in society. In the same way, Manovich (2000) says that the collection of data (information) displayed in both the database and navigable space are elements of symbolic value that earn economic value in today's society.

This certification of information may be perceived in what Johnson (2001) called the interface. The interface is composed by meta-forms, visual metaphors that take place in the digital media to make the informational chaos exploitable, thus making information accessible. The desktop, browsers are present examples of interface. The creation of interfaces is one of the objects of design work today. The designer is challenged to develop creative and cost-effective solutions in order to provide and facilitate access to information.

Due to the demands of contemporary economy, companies have sought solutions that bring together Marketing and Design tools. Through Marketing work, the brands build their audience, and because of the demands of continuous pursuit of knowledge, they implement business solutions in order to build organizational learning spaces. Because of this, the Design has been developing solutions for Education and Learning at the organizational level, to deliver solutions through studies on the display of information on company websites, in e-learning systems and in the layout of corporate education interfaces (Bayma, 2004). The interface design enables companies to respond to the demands of contemporary times and deliver a consistent workspace addressed to these issues. Nowadays, Design creates management culture not only by designing physical workspaces, but (a) by designing digital learning tools to assess and prepare sets of skills and (b) by designing interfaces that makes possible to deliver relevant information to the target audience.

As we have seen, the design work is at the heart of the transformations of objects – based situations, problems outlined from trial solutions and complex contexts - into preferred objects. This dynamic work points out the issue concerning the role of authorship in the design process.

DESIGN AND AUTHORSHIP

As noted above, Design is a field marked by its cross-disciplinary quality mixing theory from diverse associated disciplines with the designing praxis. Hence, Design is crossed by the issues concerning creation and technique. Would it be a technical or an artistic work? This is a question that produces an epistemological understanding of such profuse field of practices and knowledge. Rita Couto (1997) adds a new data to the definition of Design. The author works in line with other authors in relation to the double transitivity of Design, considering this an activity (a) led by a practical/experimental bias, but with such premisse laid on the continuous movement between

theory and practice, and (b) of a interdisciplinar character, resulting from the appropriation of theories garnered from associated fields to feed the design dynamics. Couto refers to a concept already mentioned by Cross, but this time as a fundamental part of the epistemology of Design. Understanding that the transitivity of Design is something that surpasses the categorization of Design as Art or Science, she finds in its technological bias the more accurate positioning of the field. Defining technology as "a body of knowledge - scientific, empirical or intuitive - ready to be used in the production and marketing of goods and services" (Couto, 1997), the author considers "appropriate to define design as a technology, an organized body of knowledge, classified as a discipline that can be taught through an appropriate curriculum structure" (Couto, 1997). She noted that, whenever in action, the designer appeals as much to the components of art (such as aesthetics) as he appeals to the components of science, using "scientific knowledge available to provide appropriate functional performance to the objects and materials that he developes" (Couto, 1997). For her, the designer resorts various methodological approaches, constituting Design as a discipline regarding research and development of operative technology. However, our task is not to develop an epistemological reflection on this issue. We take the Design qualities to reflect on the authorship. Therefore, what is the role of the author's name in the discursive network that leads from the design process to the creation of the product?

In “What is an author?”, Foucault (2001) points out the crucial role of the author's name in the order of speeches. The author's name becomes a discursive territory that underlay the reception of his work. Brunn (2001) agrees with this issue by stating that the authoral mythology is derived from the relationships developed in modernity between writing, author and work.

Literary writing and intelectual/artistic activities both produce artworks and, consequently, the author that signs them as a reference. Both elements feed off each other in the reception and meaning of the creation. They are territories that underpin our representations and relations with the work executed.

In "O problema da autoria: internet, literatura e ontologia", Almeida (2007) builds on the idea the five dimensions of writing: the ontological, legal, juridical, aesthetical and referential. The first is the dimension related to the creation itself, while the other four are capture mechanisms that are linked to modern authoral figure.

The legal dimension is the one related to the "criminal appropriation of discourses". It appeared historically at the time when writing was ruled as a crime. In “A aventura do livro”, Chartier (1998) states that the first cases of lists of banned books (due to its transgressive nature) ordered alphabetically by author name date from the sixteenth century. This criminal appropriation of the speeches was performed by means of repressive mechanisms associated with the practices of State and Church. It’s noticeable that this dimension refers to the accountability of the supposed agent of writing.

The juridical dimension is related to the invention of intellectual property, with the Copyright Act (1609) and the Droit d'auteur in the eighteenth century. Thereafter, the author goes on to be associated with the notion of owner.

The aesthetical dimension is linked to the concept of originality. This concept is one of the foundations of copyright in its association with the notion of work.

The referential dimension is the dimension related to the role of the author's name in the discursive network that surrounds the artwork crafted. The signature plays the role of classifying, ordering the speeches.

The question of authorship is very much in vogue nowadays, due to discussions concerning intellectual property rights on the internet and because of the criminal accountability of users' access to information on the network. However, our analysis does not point directly to these issues.

Let’s take the design process as central axis to our reflection. The design process (seen as continuous analysis and reflection on the existence) transgresses the standard features that shape the concepts of "normal", "regular", "common". Such standard, by the designer’s point of view, is presented through the ecology of existing objects. The design work produces deviations that create new sensorial experiences, new ways to manage space and knowledge. Reflecting once again on Buchanan’s placement theory, the designer produces such deviations by rearranging the elements that already compose the social and cultural fabric. When this work comes to an end – an arbitrary and momentary stop - we have a product. This product and the name of the designer or manufacturer unite themselves at this time to mark their territories. Often they are taken as marketing signs being meaningful to a product's marketability. The author's name is commonly taken as a guarantee of better merchandise, in such a complex and problematic universe that is the information society. Not only the product becomes a symbolic value in use, but the name of the designer can tow up to such an extent to the product, that the signature adds value to the artifact. In this case, the author's name in its referential dimension is the tip of the design process. It is the name that advertises its product, and therefore their death, since new creations under that same brand will make that object obsolete, "common", "normal", "regular".

The concepts turned into products receive meaning in social use. There they are assigned roles and values. Advanced technologies and techniques to enhance production create new possibilities to manipulate matter and information. Although such advances make entire generations of artifacts obsolete, sometimes we note seemingly outdated products receiving different uses, redefining themselves and changing their place and duties within social groups. Thus, moving between different bodies of knowledge in setting up their projects and dealing with the ongoing transformation of the social practices, the design work has an essential historical bias. By generating elements that will become part of the cultural fabric, the designer understands that, when interacting with other objects, their work will be modified by the relations created. Given the aforementioned, it is vital for the designer to map the range of possibilities for his production, realizing that his work is not eternal: the products have a lifecycle and this lifecycle is as large as the opportunities of transgression it carries in its use. The standard lifecycle of a product tends to be shorter year by year given the technological advances that not only enhance productivity but bring new possibilities to the products themselves (ie: the mobile devices, that once were mobile phones, now are tablets, smartphones, e-readers, music and video players, camera, etc). It must be said that to map the meaning/using dynamics of an artifact in time is not to be confused with the search for a single correct use: the designer that seeks innovation should pay attention to the possibilities that open up on the development of each project by noticing the social uses of the similar objects or the artifacts accounted in similar contexts. This transgressive designer must learn from the transgressions themselves.

Crossing Bakhtin’s theories with the epistemology of Design, we found that a project uses multiple voices in its development. For its cross-disciplinary bias and the transgression implicit in its practice, the designer resorts to the associated disciplines (Love, 2002) to create working parameters in order to analyze the artifacts that relate to the problematic situation. When analyzing the context diachronically, one can see how similar objects propose actions that contribute to solving a particular issue. Understanding, like Buchanan, that Design is grounded on placement of concepts or objects in different situations, the designer discovers the "new" in a fresh combination of pre-existent concepts, qualities or objects (including functions performed by other devices), inviting users to perform functions and find new possibilities. This is where the innovation takes place: when, in use, the individual performs new actions and when the designer can connect such actions with aspects of the present solution.

In the analysis of the impact of design changes on labour management, it is clear that design changes cultures from simple changes in the relationships between individuals, objects and environments. From the repertoire of objects formed by the ecology of today, the designer seeks to improve the performance and such a search creates leaps of innovation (a) in the development of

the work (with the generation of multiple attempts of tentative solutions), (b) in the relationship between the created object and the ecology in which it operates, (c) in the reception of the object by the individual. This reception is result of (c1) the relationship established between the new object, its predecessors and its contemporaries, (c2) the actions taken by other individuals with that object and (c3) the relationship between object and the signature of its creator.

The author function presents itself here as a link between combined ancient practices and new products. The signature serves as a bridge between expectations based on the history of objects and new uses resulting from the combination of features of previous artifacts related to the same problematic situation. It is this intersection that leads to innovation, innovation that will only be confirmed, however, when the transgressive design of the artifact is understood and once again transgressed, this time by the target users. The designer/manufacturer of the object becomes, then, an vertex that includes a new concept in the network of meanings attached to their signature and tying around him, a network of products that brings the author as a reference.

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Thomas, B. and Marsden, J. (2012). *The Metaphorical Expressions of Symmetry within Brand Marks of the Financial Services.*

THE METAPHORICAL EXPRESSIONS OF SYMMETRY WITHIN BRAND MARKS OF THE FINANCIAL SERVICES

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Organizational symbols are said to be a reflection of organizational strategy, and therefore are designed with the intention of communicating some aspect of a given corporation. However, whilst it has previously been noted that symmetry is prevalent in abstract corporate symbols—particularly in the financial sector—there has been little systematic investigation into the communicative potential of symmetries within the context of organizational symbols. Firstly this paper presents the findings of a survey of the top 100 financial brands and discusses the frequent occurrence of symmetry within these symbols. A subsequent exploration of the association between brand values and the perception of symmetry within these brand marks is discussed alongside recommendations for further study.

Keywords: Corporate Identity; Brand Identity; Visual Identity

INTRODUCTION

One of the key purposes of corporate brand marks is to communicate an aspect of organizational strategy—typically a distinctive point-of-difference. Whereas a brand mark originally functioned as an aesthetically pleasing identification tool, the primary purpose of today's brand marks is the expression of organizational values, moving beyond awareness (brand recognition and recall) to having associations that differentiate an organization's offering (Devlin and Azhar, 2004).

Within the practice of graphic design symmetry is usually associated with compositional studies rather than as a tool of expression. However simple concepts such as balance, stability and harmony can be expressed through a symmetrical composition, whereas an asymmetrical composition can evoke a sense of instability, tension and movement (Arntson, 2003). Such concepts appear to be exploited by the designers of the visual manifestations of corporate brand identities—more commonly referred to as logos.

Symmetry has long formed a central component in the design of human material culture, carrying both implicit and explicit meanings, and human cognition has evolved a perceptual system acutely attuned to detection of symmetry (Tyler, 1995; Humphrey, 2004). The prevalence of symmetry within identity design seems to indicate this ordering principle continues to be used by designers intuitively with the intention of communicating specific messages. Despite a number of earlier observations (Hargittai and Hargittai, 1997; Henderson and Cote, 1998; Miller, Foust, and Kilic, 2007), the potential of symmetry as an unambiguous and reliable communicative device, within the field of brand identity design, appears to be a relatively unexplored domain.

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A review of case studies from prominent design consultancies revealed that designers have relied upon symmetry as a visual device to communicate concepts such as cohesion, efficiency, and equality. Whilst designers might intend to communicate such concepts, there is no assurance of their reliable interpretation. However it appears that recipients are adept at assigning values and concepts to the presence of symmetry within brand identities. Recent research has indicated that symmetrical organizational brand marks were perceived as being more ethically and socially responsible than those organizations whose brand marks were asymmetrical (Van Quaquebeke and Giessner, 2010).

The initial part of this study responded to the acknowledgment of the prevalence of symmetries within the brand marks of the financial services by identifying occurrences of the different types of symmetries within this graphical context. The second stage then shifted the focus from the communicative intentions of symmetry to the recipient interpretations of symmetry within brand marks. The specific purpose was to see whether respondents perceived certain symmetries as conveying particular organizational values.

SYMMETRY AND PERCEPTION

Symmetry as a general concept refers to any action or rigid motion that maps a figure onto itself, determining how parts of the design are arranged to provide the structure of the whole. It is well established that symmetry in the plane is characterised by one or more of the following geometrical actions: translation, rotation, reflection and glide-reflection (see Figure 1).

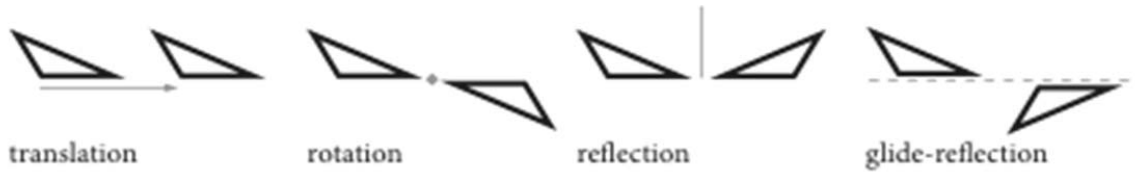

Figure 1 The four symmetry operations in the plane.

Although mathematical symmetry is defined by any one of four operations, often the term is commonly understood as specifically the action of reflection or mirror symmetry. This characteristic is also known as “bilateral symmetry”, where a figure is divided into two mirror-image parts, as shown by the action of reflection in Figure 1. Since bilateral symmetry pervades the natural world it is not surprising that there is substantial evidence that humans have a remarkable sensitivity to symmetry as an ordering principle (Gombrich, 1984). There is an observable bias in human perception for simple configurations and regularities rather than random shapes (Tyler, 1995). While there is notable superiority in the detection of vertical reflective symmetry above other types, higher order symmetries are only likely to be detected by someone exposed to an area of mathematics known as “group theory” (Humphrey, 2004). Studies have shown that infants as young as four months are able to discriminate bilateral symmetry from other forms of symmetry—although this is not an exclusively human trait (Wagemans, 1997). This phenomenon may be explained in terms of the environment in which our visual system has evolved. Human constructions have also been noted for particular emphasis on two-fold rotational symmetry (rotation through 180 degrees, as shown by the action of rotation in Figure 1). The requirements of stability, constraints of the manufacturing process and anthropometric considerations are of practical concern and may also relate to the inherent symmetries of our visual system (Tyler, 1995).

Symmetries may, of course, be produced for purely aesthetic exploration and have formed a central component of decoration in almost all human cultures, often carrying both explicit and implicit cultural values. Studies have also indicated unique symmetry preferences and that design structure, when assessed in terms of symmetry properties, is by some means culturally sensitive

(Washburn and Crowe, 1988; 2004). The prevalence of symmetry within modern brand identity design seems to indicate that symmetry continues to be intuitively used as one of a combination of graphical elements to convey meaning across multi-cultural audiences.

SYMMETRY AS METAPHOR

Symmetry has been said to evoke notions of balance, harmony and regularity stability within the context of graphic design and compositional studies (Devlin and Azhar, 2004), with bilateral symmetry expressing balance, calmness and security while stable rotational arrangements convey confidence (Gombrich, 1984). It has been noted that certain symmetries in logos may be more suitable than others, in terms of their ability to convey the nature of organizational activities (Hargittai and Hargittai, 1997). Rotational symmetry, it was suggested, would be a suitable expression for an organization such as a bank, where the cyclical nature of money would appear to be aptly represented through a rotationally symmetrical device; and indeed many financial institutions use this form of symmetry. Whilst the conveying of such operational activities may appear suitable for industries where the customer directly experiences an organization's operations (e.g. transportation), there is an intrinsic limitation of presenting such a generic perspective of an organization. Since the purpose of branding is to express a distinctive point-of-difference, the communicative emphasis would typically focus on specific organizational values rather than generic organizational activities (Murphy, 1992).

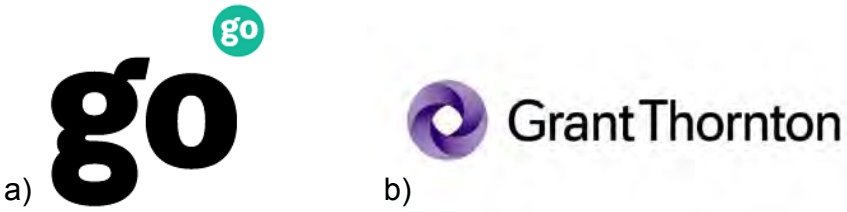

Figure 2 (a) Go airlines brand mark; (b) Grant Thornton brand mark

Designers of brand identities use graphic devices such as color, shape, and typography, to express specific organizational values. In addition to these devices, symmetrical constructions occur frequently within the design of brand identities and are seemingly being used as intentionally expressive devices. However, given the lack of literature on the communicative potential of symmetries, it appears that designers are intuitively assigning symmetry operations to organizational values. Despite this seemingly intuitive application, there is an apparent logic in the association of symmetry operations to specific concepts. For example, the brand identity for British Airways' low cost airline operator called Go used the repetition of the same shape throughout the logotype as a graphical suggestion of economy. Figure 2a shows the shape of the letter "o" which is repeated in the double loop construction of the letter "g", thereby 'encapsulating the attitude of economy' (Wolff Olins, 2002). Similarly, rotational symmetry has been used as a graphic device to suggest qualities such as cohesion and reliability. In a recently designed brand identity for the accountancy organization, Grant Thornton, the designers intended to suggest that the organization was 'becoming a more cohesive, global organization' by using rotational symmetry (Spaeth, 2008), as shown in Figure 2b. This symmetry operation has also been used for newly merged organizations, where rotational symmetry has been used to express the concept of unification around a central point (Marquesman, 2001).

In contrast, the recent asymmetrical brand mark created for London 2012 Olympic and Paralympic Games was described by its designers as 'unconventionally bold, deliberately spirited, and unexpectedly dissonant', a mark that reflects London's 'modern, edgy' qualities (Wolff Olins, 2011). In the unveiling of this case, the interpretation of the symbol—and the subsequent response—generated significant critical debate, most of which was negative (BBC, 2007). Whilst

designers might intend to convey specific messages through the design of brand marks there is no assurance that given meanings will successfully be interpreted by receivers. Accordingly the communication of meaning requires both an initiator and a receiver, neither of which 'has a monopoly on the meaning that passes between them' (Dey, 1993: 35).

The expression of reliable messages through brand identities is said to be more crucial in the service sector due to the relative intangibility of offerings (Miller et al, 2007). Research has indicated that financial services are among those service industries perceived as most intangible by consumers with banking products more or less indistinguishable (Devlin and Azhar, 2004). With such market conditions it is particularly important for financial brands to convey appropriate meanings in order to attain a clear customer understanding of the brand. One strategy, termed "association", is to link intangible elements to tangible symbols that convey appropriate meanings. For example, Legal and General's umbrella symbolizes "protection" or the ING lion that conveys "strength". In addition to associative symbols, symmetry and balance, with sufficient complexity of design to maintain the viewer's interest, have been shown to enhance the positive affective response of a brand mark, while the repetition of elements and moderate—although not perfect—symmetry enhances recall (Miller et al, 2007). Perceptions of ethical leadership are also noted as being influenced by the visual cues of symmetry. Recent research suggests that organizations, whose brand marks contained symmetry, were perceived as being more ethically and socially responsible than those organizations whose brand marks were asymmetrical (Van Quaquebeke and Giessner, 2010). Accordingly there appears to be a distinct association between symmetry operations and specific organizational values. Nevertheless despite the intended communication of concepts through visual devices, designers have no assurance in their reliable interpretation.

METHOD

The initial part of this investigation identified the prevalence of symmetry within the brand marks of the financial services, supported by an analysis of case studies from prominent design consultancies on the intended use of symmetry as a visually expressive device. Published studies that have analyzed brand identities have only considered a limited range of symmetries, focusing specifically on reflection across a vertical axis (Henderson and Cote, 1998; Miller et al, 2007). In addressing this limitation a comprehensive analysis of brand symbols was undertaken to identify the specific symmetry operations present. The Brand Finance Banking 500 (2011) league table was used to identify the top 100 global financial brands, which generates a brand's value by approximating a net present value based on a discounted estimation of future royalties (Brand Directory, 2011). The brand identities—or more specifically, the brand marks—were analyzed for their constituent symmetries and then grouped into one of five mark types: those with perfectly symmetrical symbols; those with close—or perceived—symmetrical symbols; combination marks, consisting of a graphic device and logotype arranged in a near symmetrical manner; asymmetric symbols; and logotypes (stylized name-marks). Examples from each of these categories are shown in Figure 2.

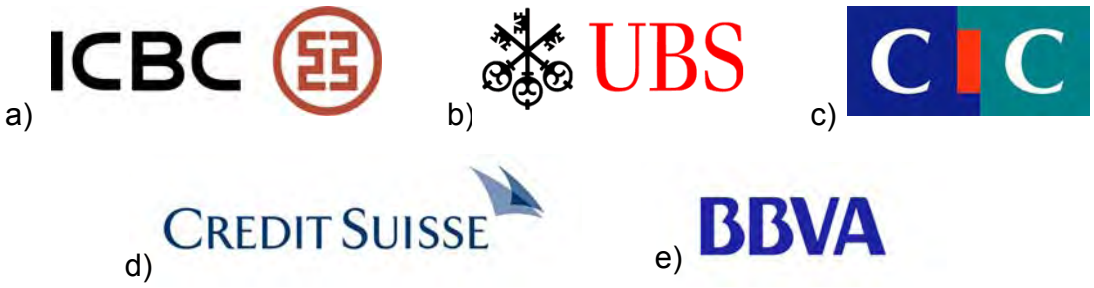

Figure 2 *Brand mark examples from (a) group A – ICBC Bank; (b) group B – UBS; (c) group C – CIC; (d) group D – Credit Suisse; (e) group E – BBVA*

The second stage of the research explored the interpretations of symmetry within brand marks. The aim was to see whether respondents perceived particular symmetries as conveying specific organizational values. However while the associations of brand marks were gathered it was an intrinsically difficult task to correlate the interpretation of a brand mark with the singular variable of symmetry, particularly when considering the interconnected devices of design, such as shape, image, color and typography. Therefore this second stage comprises a series of surveys isolating variables to assess and develop an understanding of the findings.

From within the sample of symbols categorized as displaying symmetrical, perceived symmetrical and asymmetrical symbols, ten exemplars were selected for having properties that best exhibited the boundaries of the groupings (Figure 3). It was equally important that these exemplars had low recognition with the respondents, as the study sought to test the perceptions of the brand marks alone, as opposed to the brand associations built from other marketing communications. A significant limitation noted in previous studies has been the reliance on brand experts' opinions. This study therefore explores the consumer perception of brand values as expressed through the corporate brand mark alone.

Figure 3 Selected brand marks. Symmetrical symbols: (a) Bank of Yokohama, (b) Banamex, (c) DBS Bank, (d) PNC Global Investment Servicing. Perceived symmetrical symbols (e) Garanti, (f) National Australia Bank, (g) VTB. Asymmetrical symbols: (h) Merrill Lynch, (i) RBC Royal Bank, (j) Nordea.

A series of surveys were conducted presenting ten exemplars alongside six of the most frequently occurring organizational values—ethical, integrity, excellence, innovation, teamwork and customer satisfaction (Lencioni, 2002). Respondents were instructed to disregard any of brand marks that were familiar through prior communications and were asked to highlight any of the given organizational values that they perceived to be expressed in each of the marks. As an emergent research design a comment box was provided to elicit explanations supporting their perceptions, in order to determine the key variables for further investigation (i.e. color, typeface, etc).

SYMMETRY IN BRAND IDENTITIES OF THE FINANCIAL SERVICES

Brand identities of the top 100 global banking brands were selected for analysis (Brand Directory, 2011) and categorized into one of five types. The first group (A) consisted of brand marks containing symbols that exhibited perfect symmetry. It was noted that symbols within this group were often used as recognizable, stand-alone marks by the organization without a supporting logotype. The second group (B) consisted of brand marks containing symbols that displayed a close—or perceived—symmetry. The third group (C) contained combination marks, consisting of a graphic device and logotype arranged in a near symmetrical manner. In these cases the graphic device served as a support to the logotype rather than as a separate component, as shown in

Figure 2c, in which the logotype is arranged on the point of two-fold rotation. The fourth group (D) consisted of asymmetric symbols; and the fifth group (E) contained logotypes only (stylized name-marks).

Of the 100 brand marks reviewed, 13 were categorized as consisting of a logotype only (group E). A further 7 were found to contain combined brand mark elements (group C). As the graphic devices of group C were not considered as symbols but an element supporting the logotype, these were discounted leaving a sample of 80 marks containing symbols that were analyzed for their constituent symmetries.

Taking cognizance that minor deviations from perfect symmetry are rarely noticed (e.g. we pay little attention to the asymmetries of the human face as long as expected features are roughly in place) (Grombrich, 1984) and minor departures from perfect symmetry can break the monotony of a simple construction (Miller et al, 2007), groups A and B (exact and perceived symmetrical constructions) were considered together. The results showed that just over half (51 per cent) of the marks contained symbols exhibiting exact or perceived symmetries (40 per cent and 11 per cent respectively), with 49 per cent of the sample considered asymmetrical. Analysis of the symmetries prevalent within the marks of groups A and B (exact and perceived symmetrical constructions) showed a clear prevalence of bilateral reflection (44 per cent) followed by two-fold rotational symmetry (34 per cent) above other multiple symmetries, as consistent with the literature (Grombrich, 1984).

THE PERCEPTION OF FINANCIAL BRAND VALUES

Having acknowledged the prevalence of symmetry within brand marks of the financial services, the second stage of the research sought to explore whether respondents perceived symmetries as conveying particular organizational values. From within the sample of symbols categorized as symmetrical, perceived symmetrical and asymmetrical (groups A, B and D), ten exemplars were selected for having properties that best exhibited the boundaries of the groupings, as shown in Figure 3.

EXPLORATORY STUDY ONE: ACCURATE REPRESENTATION

An initial exploratory survey was conducted with postgraduate students studying at the University of Leeds. A sample of 47 respondents was used for data collection consisting of 23 design students and 24 non-design students. The ten exemplar marks were presented in full color as they would be viewed in a real-life context, alongside six of the most frequently occurring organizational values of ethical, integrity, excellence, innovation, teamwork and customer satisfaction (Lencioni, 2002). Respondents were asked to examine the brand marks and to highlight any of the given organizational values that they perceived to be expressed in each of the marks, disregarding any marks that were familiar through prior communications. A comment box was provided to elicit explanations in order to determine the key variables for further investigation (i.e. color, typeface, etc). The results are presented in Table 1.

Table 1 Findings from exploratory study one: absolute and relative frequencies

		V1		V2		V3		V4		V5		V6	
Group	**(n=47)**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**
A	**Banamex**	8.0	17.0	13.0	27.7	5.0	10.6	8.0	17.0	27.0	57.4	12.0	25.5
A	**PNC**	13.0	27.7	14.0	29.8	7.0	14.9	12.0	25.5	22.0	46.8	9.0	19.1
A	**DBS**	5.0	10.6	15.0	31.9	15.0	31.9	2.0	4.3	23.0	48.9	13.0	27.7
A	**Bank of Yoko.**	10.0	21.3	15.0	31.9	15.0	31.9	11.0	23.4	16.0	34.0	12.0	25.5
B	**NAB**	5.0	10.6	6.0	12.8	16.0	34	14.0	29.8	10.0	21.3	7.0	14.9
B	**VTB**	5.0	10.6	20.0	42.6	9.0	19.1	6.0	12.8	11.0	23.4	5.0	10.6
B	**Garanti**	22.0	46.8	6.0	12.8	3.0	6.4	21.0	44.7	10.0	21.3	14.0	29.8
D	**Merrill Lynch**	6.0	12.7	17.0	36.1	23.0	48.9	4.0	8.5	5.0	10.6	8.0	17.0
D	**Nordea**	9.0	19.1	6.0	12.8	11.0	23.4	19.0	40.4	7.0	14.9	13.0	27.7
D	**RBC**	16.0	34.0	17.0	36.1	20.0	42.5	3.0	6.3	6.0	12.7	17.0	36.1

The most frequently occurring value assigned to the rotationally symmetrical symbols the interpretation of “teamwork”, with a group average of 47 per cent. The Banamex symbol, with the most explicit symmetrical construction, was assigned this value by 57 per cent of respondents, followed by DBS (49 per cent) and PNC (47 per cent). A typical respondent explanation for this interpretation was the ‘unification of individuals parts’. The second most frequently assigned value to the symmetrical symbols was “integrity” (30 per cent). In the case of Bank of Yokohama, the only reflective symbol from group A, the assignment of values showed a greater spread across the range of values. By contrast, the figurative asymmetrical symbols of Merrill Lynch and RBC showed a low occurrence in the perceived values of “teamwork” (11 per cent and 13 per cent, respectively) and “innovation” (9 per cent and 6 per cent, respectively).

It was apparent from the findings that in the instances where abstract symbols resembled figurative marks that there appeared a greater reference to the totality of the shape—or gestalt—as opposed to the construction. For instance, the NAB symbol was interpreted as “excellent” and “innovative”, which fits the metaphorical associations of a star. Similarly the symbol for Garanti was assigned the value of “ethical” by 47 per cent of respondents, with supporting statements referencing the leaf-like shape and the color green. In both of the aforementioned cases no reference was made to the construction of the shape.

EXPLORATORY STUDY TWO: MONOCHROME REPRESENTATION

It has been noted that structural devices such as symmetry are independent of scale and color, while perception and the subjective response to visual design is dependent on many factors (Grombrich, 1984). In response to the findings from the preliminary study where color was occasionally cited as the signifier of an organizational value rather than the graphical construction, monochrome reproductions were chosen for the next stage of the study.

The second survey was conducted with a sample of 131 undergraduate respondents studying at the University of Leeds. The ten exemplar marks were presented in monochrome alongside the same organizational values—ethical, integrity, excellence, innovation, teamwork and customer satisfaction. As before, respondents were asked to highlight any of the given organizational values that they perceived to be expressed in each of the marks and a comment box was provided. The results are presented in Table 2.

Table 2 Findings from exploratory study two: absolute and relative frequencies

		V1		V2		V3		V4		V5		V6	
Group	**(n=131)**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**	**Abs.**	**%**
A	**Banamex**	42.0	32.1	27.0	20.6	13.0	9.9	46.0	35.1	67.0	51.1	27.0	20.6
A	**PNC**	27.0	20.6	28.0	21.4	29.0	22.1	39.0	29.8	50.0	38.2	14.0	10.7
A	**DBS**	9.0	6.9	36.0	27.5	47.0	35.9	16.0	12.2	41.0	31.3	39.0	29.8
A	**Bank of Yoko.**	20.0	15.3	31.0	23.7	51.0	38.9	46.0	35.1	35.0	26.7	27.0	20.6
B	**NAB**	35.0	26.7	12.0	9.2	44.0	33.6	20.0	15.3	25.0	19.1	25.0	19.1
B	**VTB**	10.0	7.6	26.0	19.8	27.0	20.6	31.0	23.7	24.0	18.3	17.0	13.0
B	**Garanti**	71.0	54.2	24.0	18.3	21.0	16.0	51.0	38.9	28.0	21.4	37.0	28.2
D	**Merrill Lynch**	15.0	11.4	47.0	35.8	40.0	30.5	14.0	10.6	26.0	19.8	19.0	14.5
D	**Nordea**	25.0	19.0	24.0	18.3	16.0	12.2	57.0	43.5	23.0	17.5	31.0	23.6
D	**RBC**	20.0	15.2	65.0	49.6	81.0	61.8	9.0	6.8	17.0	12.9	48.0	36.6

The results showed that despite the monochrome representation, the most frequently occurring value assigned to the rotationally symmetrical symbols of Banamex and PNC remained as “teamwork”, with this value assigned by 51 per cent and 38 per cent of respondents, respectively. The DBS symbol was most frequently associated with the value “excellence” (36 per cent) with “teamwork” declining to 31 per cent from the previous 49 per cent. A typical respondent

explanation for this interpretation was the ‘star-like’ construction. In this instance, the variable of color appears to have influenced the perception of shape. In the case of Bank of Yokohama, the assignment of values continued to show a greater spread across the range of values, with the highest association with “excellence” (39 per cent). The bilateral orientation of the symbol’s peak attracted comments relating to ‘aspirations’.

The figurative asymmetrical symbols of Merrill Lynch and RBC continued to be most frequently assigned values of “excellence” (31 per cent and 62 per cent respectively) and “integrity” (36 per cent and 50 per cent respectively). These symbols continued to show a lower occurrence in the perceived values of “teamwork” and “innovation”. By contrast, the abstract asymmetrical symbol of Nordea retained a high frequency of association with the value “innovation”. The non-standard shape and diagonal line were noted as suggesting ‘originality’.

Of the marks categorized as perceived symmetrical (group B), the NAB symbol retained the most frequent interpretation of “excellence” (34 per cent), however, the association with “innovation” declined within the monochrome reproduction to 15 per cent. The perception of this mark as “ethical” increased to 27 per cent from the previous 11 per cent. Similarly the symbol for Garanti was assigned the value of “ethical” by 54 per cent of respondents. The association of this shape with the value appeared to be more pronounced without the reinforcing color association of green; the other perceived brand values followed the same ranking order. The influence of color appeared most pronounced within the variation of responses for the VTB mark. The accurate color representation elicited a most frequent response associating the mark to “integrity” (43 per cent). The monochrome representation of the brand mark received a greater spread of responses, with 23 per cent of respondents unable to perceive any of the listed value within the mark.

DISCUSSION

Previous research on the expressive potential of symmetry classified symmetry on the basis of reflection alone, often interpreting the characteristic of rotation as “balanced” (Miller et al, 2007; Henderson and Cote, 1998). This study has addressed this limitation by investigating the communicative potential of a greater range of symmetry operations within the domain of brand mark design and represents the preliminary stages of an exploration into the communicative value of symmetry in design.

Although an analysis of the brand mark symbols of the leading 100 international financial brands indicates a preference towards the use of bilateral reflection, as consistent with the literature (Tyler, 1995; Wagemans, 1997; Humphrey, 2004), the findings of this study have revealed that rotation appears to be the more expressive symmetry device. This was particularly notable within abstract non-figurative symbols, such as those exhibited in the marks of Banamex and PNC. The device was frequently interpreted as conveying the organizational value of “teamwork”. This finding supports the claimed intentions of the Grant Thornton and Natwest case studies where rotational symmetry had been intentionally used as to visually suggest cohesion and unification (Marquesman, 2001; Spaeth, 2011). The qualities of cohesion and unification could be considered as inherent properties of teamwork.

In cases where abstract symbols contain a figurative resemblance, the interpretation seemed to be derived from the literal representation of the symbol and the construction, symmetrical or otherwise, appeared to have limited expressive function. This was seen in the association of values with the Garanti brand mark. When the meaning of an abstract symbol is not readily apparent, i.e. where the mark contains little figurative resemblance or few structural components, color becomes a more important signifier, as seen in the case of VTB.

The methodology used in this study had its limitations. While the associations of brand marks were captured it was an intrinsically difficult task to correlate the interpretation of a brand mark with the singular variable of symmetry, particularly when considering the interconnected devices of design, such as shape, image, color and typography. It was apparent from the initial survey that

there was an inherent limitation in restricting analysis to the effects to symmetrical form while omitting the effects of color. For this reason this second stage of this research sought to remove the variable of color through the use of monochrome reproductions of the brand marks. However it has to be acknowledged that the darkness—or value—of the reproductions did not entirely remove the potential to influence the interpretations of the brand marks.

Nevertheless these findings provide several points of departure for further study: firstly a more detailed exploration of the implicit and explicit values that designers intend to express through symmetry; and secondly pursue a quantitative study that focuses on the single variable of symmetry and its perception by key institutional stakeholders.

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STRATEGY DEVELOPMENT IN THE DESIGN SECTOR: A THEORETICAL PERSPECTIVE

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This theoretical paper aims to discover the characteristics of the design sector that are of influence to strategy development within design firms. By relating the literature of strategy to the creative industries and the literature on the design sector, a conceptual model that indicates the idiosyncrasies of the design sector is constructed. These idiosyncrasies include: the size of the firm, creativity as main source of value creation, the orientation of the owner-manager and dependency on strategic networks. These characteristics command a distinctive strategy development model that is not directly transferable from the mainstream strategy theories.

Keywords: Strategy development; design firms

INTRODUCTION

Over the last two decades there has been an increasing scholarly interest in the realm of design (see: Cooper *et al.*, 2009; Kim & Chung, 2007) and particularly around the notion of design as a process above design as an outcome (Brown, 2008; Cooper & Press, 1995; Martin, 2009). The perspective of design as a process stimulated research on the strategic influence of design within the business environment, such as *strategic design* (see: Kim & Chung, 2007; Lorenz, 1994), *design thinking* (see: Brown, 2008; Martin, 2009), *service design* (see: Hollins & Hollins, 1991) and *branding design*. Research in these areas give designers and design firms a better understanding of the concept of (business) strategy and how their design services relate to business strategies of their clients. Although design firms have increased their knowledge of the interface between design and strategy, they rarely apply strategic thinking to their own business (Sung *et al.*, 2010). Neither scholars in the design realm nor scholars in the strategy realm have shown much interest in the topic of business strategy within the design sector (Seidel, 2011; Sung *et al.*, 2010) or within the cultural or creative industries of which the design sector is a part of. As a consequence, there exists a lack of literature surrounding the topics of business strategy within the design sector.

The purpose of this study is to relate the characteristics of the design sector that are of influence to strategy development, to the strategy literature. The focus is on visual communication design and specifically on the: digital-, multimedia-, communication- design (DMCD) sub-sector; leaving out the built environment design and manufacture design[†]. In this paper, the DMCD sector is referred to as the design sector to increase the readability.

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[†] *See the classification of the Design Institute Australia: design for manufacture, design for build environment and design for visual communications (DIA, 2005)*

METHODOLOGY

This study is based on a critical examination of the literature. The topics that are reviewed are that of the creative industries, creative process, studies in the design sector, strategy and strategic management literature. The literature is identified through a boolean search on terms such as: 'design firm', 'creativity management', 'creative industries' and 'strategy', through search engines, among others: EBSCO, Web of Knowledge and Google-Scholar. In addition, 'pearl fishing' was practised to gather related topics and to deepen the understanding of specific aspects, including: creativity, value creation and strategic networks.

Literature on management of design and the organisation of design firms on both micro and macro level are scarce (Lampel *et al.*, 2000). Yet, the design sector is a part of the cultural and creative industries (DCMS, 1998; KEA European Affairs, 2006) which allows to extend the literature resources to the creative industries. Many of the distinctive features of the cultural and creative industries, such as creativity as a main source of value creation, are also evident in design firms. For example, the design sector shares many of its characteristics with the gaming industries. Both sectors utilise a project-based workflow, interdisciplinary teams and make use of a highly specialised technical systems such as 3D modelling and rendering software.

While the correlation between design firms and the overall cultural and creative industries is apparent, it has to be noted that the differences among sub-sectors within the cultural and creative industries can also be great (Miège, 1987); not all characteristics of the creative and cultural industries are similar to those of the design sector. To illustrate, a large part of the culture and creative industries have a business model constructed on a revenue stream based on intellectual property (IP) rights, hence a business-to-consumer model. In contrast, the (DMCD) design sector utilise predominantly a work-for-hire business model, thus a business-to-business model. This has major implications for strategy development and marketing efforts.

WHAT IS STRATEGY

There are numerous definitions and perspectives on the term 'strategy'. For instance, Mintzberg *et al.* (1998, 2009) define the variety of perspectives on strategy, which they refer to as 'the strategy jungle' in ten different schools of thought. Others (e.g. Meyer & de Wit, 2004) avoid giving a definition of the term because of its wide range of interpretations and non-consensus among researchers and theorists. Nonetheless, Bailey & Johnson (1995) describe strategy in an elegant way that stretches the overall purpose of the term, to state: "Strategy can be seen as the direction an organisation actually pursues over time, intended or not." (Bailey & Johnson, 1995, p. 2). They aptly point out that strategy doesn't have to be necessarily intended, as echoed from Mintzberg (1978) and Mintzberg & Waters (1985). While this definition of strategy can be considered to be an objective description of what strategy is, it is not directly a useful perspective for practice since it considers strategy to be recognised in hindsight. Instead, to make strategy useful for organisations so that it can improve or sustain their business, a perspective that includes the process of strategy is more useful. In line with the aim of this study: to investigate which characteristics influence the strategy development process in design firms, the focus of this study is less about the objective theoretical perspective of what strategy is, but rather about the process and context of strategy.

A definition of strategy that includes the process and context of strategy is given by Haberberg & Rieple (2008, p. 6): "A strategy is the set of actions through which an organisation, by accident or design, develops resources and uses them to deliver services or products in a way which its users find valuable, while meeting the financial and other objectives and constrains imposed by key stakeholders.". Indeed, strategy is about the actions that the firm takes, intended or not, that determine the direction of the firm.

Despite the acknowledgement that strategy can result from accident, hence can be emergent, most theories have been founded on the intended, deliberated way of strategy making and are seen as the mainstream perspective on strategy (Bailey & Johnson, 1995). This perspective is rooted in the pioneering writings on (corporate) strategy (e.g. Andrews, 1971; Ansoff,

1965) that are founded on the deliberate and rational way of strategy making. According to Whittington (2001), these theories are derived from the 'rational economic man' as described by Hollis & Nell (1975). This school of thought perceive strategy as deliberately, rationally constructed and are grounded in analytical methods that measure the internal processes and the external environment (Bailey & Johnson, 1995). The precondition of using analytical methods is the ability to measure and quantify both the internal (e.g. the value creation process) and the external environment (e.g. market analysis). Because of the rational and analytical nature of these mainstream strategy theories, these theories have been applied to organisations that have a quantifiable, measurable nature. This measurable nature means that the value creation process, thus the process in which the organisation creates its value, can be measured by metrics. Indeed, it was the process oriented management studies of Fredrick Taylor (1911) that enabled every movement and second of the production process to be measured, calculated and quantified. This 'scientific' mode of management was the basis for the rational and deliberate strategy process based on measurable metrics. It is often referred to as the 'design school' (Mintzberg, 1990; Mintzberg *et al.*, 1998) or the 'classical approach' (Whittington, 2001). These analytical and systematic approaches became the predominant way of thinking about and dealing with strategy (Bailey & Johnson, 1995) and are aimed to drive economics of scale and scope (Chandler, 1990).

DESIGN FIRM CHARACTERISTICS

A number of design industry research programmes (e.g. BNO, 2011; Design Council, 2010b; DIA, 2005; KEA European Affairs, 2006; Wolf & Flierl, 2005) identified that the majority of design firms are SMEs[*] or even MSEs[†]. For example, in the UK the majority of the design businesses employ less than four employees (Design Council, 2010a). The size of an organisation has a direct implication on how strategy is developed within a firm. Verreynne (2004) found that the strategy models for large firms fail to be transferred to smaller firms. Instead of adopting formal, rational modes of strategy-making, small firms rather utilise non-rational, emergent intrapreneurially, participative and simplistic modes of strategy-making (Verreynne, 2004). These non-rational, emergent intrapreneurially modes are often the consequence of the owner-manager's influence. Indeed, the personal characteristics of the owner-manager of the firm, determines much of the strategic direction as well as the underlying modes of strategy processes (see: Eisenhardt, 1999; Karami *et al.*, 2006; Zhang & Bruning, 2011). For instance, Wang *et al.* found that "levels of strategic planning are higher in SMEs which have owner-managers who are growth orientated and lower in those which have owner-managers who pursue non-economic personal agendas" (Wang *et al.*, 2006, p. 10).

In the design sector, the majority of the owner-managers have a creative educational background and have been employed mainly in the creative industries. Chaston (2008) and McCauley (1999) found that these 'creative individuals' often have objectives that are related to their lifestyle and their personal satisfaction rather than economic objectives. This personal satisfaction is attained by artistic self-expression, which is expressed in the products they create and is often supported by the philosophy 'arts for arts sake'. As Chaston notes "The creative industry is a prime example where lifestyle is commonly much more important than financial gain." (Chaston, 2008, p. 820). Consequently, "[the] creative person's dilemma is essentially that of being 'market' versus 'product' orientated." (Chaston, 2008, p. 821). This dilemma determines the way in which strategy is developed within the design firm. If the owner-manager has predominantly a market focus and emphasising financial performance, customer requirements will be of importance to the firm. To identify these customer requirements, some sort of market analysis will be utilised which will favour a rational, data driven analytical strategy process. Conversely, if the firm has a lifestyle focus which emphases personal satisfaction and artistic self-expression, customer

[*] *SME: Small and Medium Enterprises, consisting of 10 - 250 employees (European Commission Enterprise and Industry, 2005)*
[†] *MSE: Micro and Small Enterprises, consisting of 1-10 employees (European Commission Enterprise and Industry, 2005)*

requirements will be of less importance and rational analytical strategy development processes are of less interest.

Seeing strategy as a set of actions through which an organisation delivers value to their users (Haberberg & Rieple, 2008), the process that creates the value, thus the value creation process, need to be identified to determine which actions are taken, or need to be taken which in turn results in a strategic direction (either intended or unintended). According to Porter (1985), the value creation process can be analysed by deconstructing it in a chain of activities referred to as the 'value chain'. From an industry perspective, the overall creative industries value chain consists of four chains: concept creation, production, distribution, and retail and consumption (see figure 1). In first instance, it does not differ much from value chains of for example the manufacturing industries. However, the distinctive differentiation aspect is where the *main value* is created. While in manufacturing firms, the main value is created in the production and the consequent chains, the opposite is true for the creative industries. Indeed, in the cultural and creative industries, the main (intellectual) value is generated in the initial concept creation stage of the value chain (The Technology Strategy Board, 2009). The output of the design sector is an intangible product and will result in monetary value gained through Intellectual Property (IP) rights, trade or information services (DCMS, 2001; UNCTAD, 2008). This main source of value creation and the fact that monetary value is gained by the delivery of intangible products are the most distinguishing characteristics that differentiate the design sector to that of other industries.

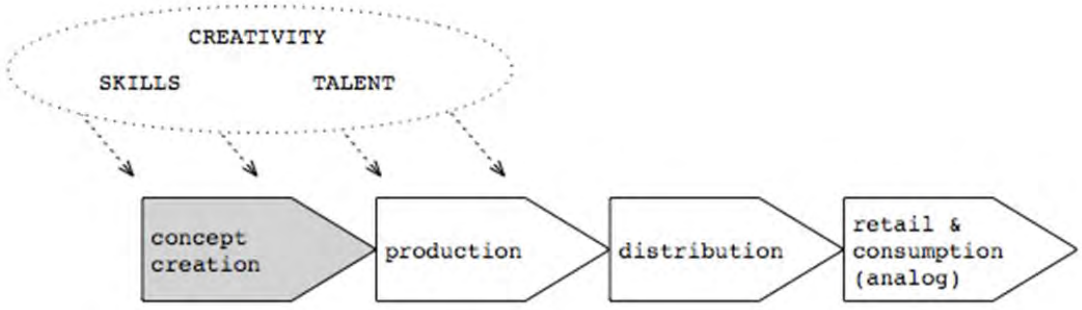

Figure 1 Creative industries value chain (DCMS, 2001; Pratt, 2004a; UNCTAD, 2008)

The intellectual value that is generated in the initial concept creation phase are based on three ingredients, namely: creativity, skills and talent. Indeed, the Department for Culture Media and Sport (DCMS) states that the creative industries are characterised by the fact that they have their "origin in individual creativity, skill and talent" (DCMS, 1998). These three aspects can be referred to as the (intangible) resources a creative firm needs to possess to create its main value. As strategy development is about taking the actions in ways that the resources create the most optimal value for the customer, design firms need to place emphasis on the resources that possess creativity, skills and talents, which are 'embedded' in creative individuals. While skills and talent can be considered fixed aspects that a creative individual possesses or doesn't possess, creativity is a phenomenon that does "not happen inside people's heads, but in the interaction between a person's thoughts and a socio-cultural context" and is "a systemic rather than an individual phenomenon." (Csikszentmihalyi, 1996, p. 24). That means that creativity is highly sensitive towards the social, cultural and managerial environment in which it is practised, as many studies have indicated (e.g. Amabile *et al.*, 1996; Woodman *et al.*, 1993).

To recapitulate Seidel (2011): creativity is about creating something novel and appropriate within the context of products, services or ideas (see also: Durling, 2003). Novelty is about creating something new, which lays at the heart of a creative product. Appropriateness refers to the value that the customer perceives in the product and how it is "recognised as socially valuable in some way to some community" (Sawyer, 2006, p. 27). While both are essential for the product that the design sector delivers, these aspects cause a conflict within the management of the creative

process. Novelty is the product of creativity and as creativity requires a managerial 'vacuum' in which it can flourish (Amabile, 1998), this managerial vacuum is contrasting with the appropriateness —which commands a direction from outside of the creative process. Indeed, creative products in the design sector are highly customised and appropriateness plays an important role to satisfy the customers' need. Thus, on the one hand managerial freedom to achieve novelty and let creativity flourish (Amabile, 1998; Woodman *et al.*, 1993) is crucial, but on the other hand, direction is required to guide the creative process into the desired, appropriate outcome. To find the balance between creative autonomy and creative direction causes that the managing of the creative process is a difficult, but important task within the design sector (Thompson *et al.*, 2007). But moreover, this balancing act of management and non-management influences the strategy development process. When utilising a deliberate strategy development mode, a managerial vacuum will constrain the directive process. While in large firms the individual creative production process does not have a direct impact on the overall strategic direction of the firm, in small firms, the choice and direction of creative products can have an influence on the overall direction, hence the strategy of the firm. Therefore this tension between management and freedom has an important implication on the ability to utilise a deliberate strategy development processes within design firms.

Another constrain is the appropriateness in terms of the success of the product towards to end-consumer which is difficult to predict. The success and demand of a creative product is highly dependent on unpredictable external factors such as social and cultural trends (Rieple & Gander, 2009). Consequently, the combination of a highly flexible and unpredictable demand, the small firm size and the flexible service offering based on an interdisciplinary approach (see figure 2), forces design firms to make use of flexible resources. This makes the use of external knowledge and skills networks inevitable (Bilton, 2007; Fleming, 2003; Hölzl, 2005; Je□cutt, 2009; Nachum & Keeble, 2003; Pratt, 2004b; Purvis, 1996; Sunley *et al.*, 2009).

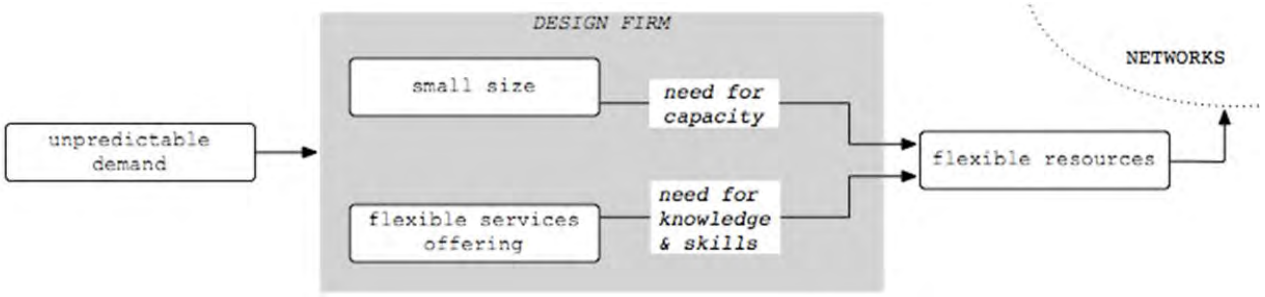

Figure 2 Causes for the requirement of flexible resources

While these external knowledge and skills networks are partly accessed remotely through online communities (Cohendet & Simon, 2007), some of this knowledge and skills are needed on-site because of technical limitations (e.g. access to large data sets), complexity of the product or interdisciplinary nature of the product, which demands personal, real-life interaction (see: Cohendet & Simon, 2007, p. 597). The basis for these external knowledge, skills and talent networks are mainly constructed out of social relations (Rieple & Gander, 2009) with freelancers and even employees of rival firms (Cohendet & Simon, 2007). These external personal networks have a direct impact on the strategy the firm develops (Ostgaard & Birley, 1994). By relating to a personal network and thus extending internal resources, a better competitive advantage can be reached (Dyer & Singh, 1998).

Since strategy is dependent on the resources it can utilise, the use of external networks, thus the extension to external resources have an influence on the strategy development of the firm.

IMPLICATIONS FOR STRATEGY DEVELOPMENT IN DESIGN FIRMS

While economies of scale and scope are beneficial for organisations that have a quantifiable value creation process, such as manufacturing firms, they are of less interest to service organisations such as the design sector, because of the unquantifiable nature of the value creation process, the highly customised services that they offer (Miozzo *et al.*, 2010), and the creation of meaning rather than producing efficiency (Lawrence & Phillips, 2002). For example, the main value a car manufacturer creates resides in the production line where the car is created. The processes of the production line can be quantified and rational, analytical management processes can be applied so that the outcomes can be predicted and the process optimised. Conversely, the main value in design firms is created by the exploitation of creativity which is based on a "divergent, impulsive, 'messy'" (De Bono, 1992, p. 2) value creation process and managerial freedom (Amabile *et al.*, 1996) in which the end-goals are described rather than the processes (Amabile, 1998). Consequently the main value creation in design firms is difficult to quantify in numbers or exact measurements (Heskett, 2009) and to manage in a 'scientific' fashion. For this reason, the deliberate designing of strategy that is based on analytics and rationality is problematic to implement in a design firm.

Besides the customised product which restricts economies of scale and scope, and the unquantifiable nature of the value creation process, the owner-manager orientation can prevent classical, rational strategy process to be transferable to the design sector. If the owner-manager has a product orientation, analytical methods are most likely of less interest compared to the owner-manager that has a market focus in which market analysis is central. Indeed, the orientation of the owner-managers that direct the firm play an important role in determining the direction of the firm (Zhang & Bruning, 2011), hence the strategic actions that determines the strategy the firm attains (Bailey & Johnson, 1995).

Finally, due to the small firm size, flexible customer demand and flexible product offering, design firms are highly dependent on external knowledge and skills networks, causing that network relationship management is of importance. The dependency on external networks can influence the actions that lead to the overall direction the firm takes since the external networks are part of the resources. If for example a new programming language that is embedded in the creative product is in high demand by the customers, it is of importance that knowledge and skills that can deal with this programming language are brought in-house, either through hiring skilled employees or through external (freelance) networks. Based on the demand of the customer, availability and price of these individuals that possess the knowledge and skills in the external networks, decisions could be made to either employ this a skilled individual on a fixed or on a freelance basis.

CONCEPTUAL MODEL

The deliberate and analytical nature of mainstream strategy theory conflicts with the characteristics of the design sector. Indeed, the literature of the creative industries and design sector suggest that the design sectors' main value is based on creativity which commands a value creation processes that is 'messy' and intuitive. The creative products in the design sector demand a managerial tension between managerial freedom, which stimulates creativity, and creative direction because of the highly customised nature of the products. In addition, because of the lifestyle orientation that is often apparent in design firms, a tension exists between the product (lifestyle) orientation and the market focus. While the market focus can be related to an analytical approach for market analysis, the product orientation is less concerned with external demands and can be rather related to an intuitive and emergent strategy development model. As well, because of the flexible demand and small size of most design firms, the need for external knowledge and skills resources demands flexible resource management, hence demands the settlement within external networks. These distinctive characteristics of the design sector require a specialised strategy development model based on intuition, emergence and flexibility.

These three distinctive characteristics of a design firm, contradicts with the mainstream strategy theory that dictates top-down directions into the value creation process, thus production process. Instead, a loose relationship between the creative production process and the overall strategy seems more suitable for a design firm. That means that only the end-goals are set, such as Amabile (1998) suggests, while leaving the actual creative production process within a managerial 'vacuum'. The case study in the gaming industries of Cohendet & Simon (2007) identify this flexible relationship between overall strategic goals and creative managerial freedom. This link between project level and overall strategy can drive the emergent aspect of strategy development, in which strategy is in fact fused from the projects that are executed. Furthermore, the flexibility demands a close relation to external knowledge and resource networks, which can influence the actions the organisation takes and can lead to the overall direction of the firm, hence the strategy of the firm.

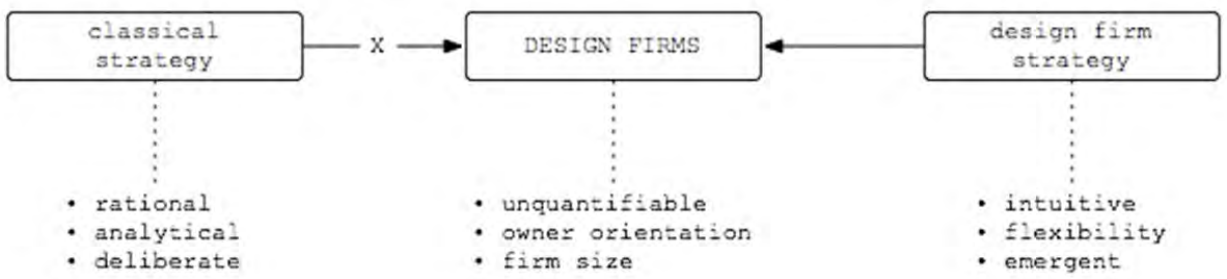

Figure 3 Conceptual relationship between strategy and design firms

CONCLUSION

The overall question this paper poses is: what are the characteristics of the design sector that are of influence to strategy development. While the mainstream strategy development theories have been studied within a wide variety of industries, the creative industries and the design sector have been largely neglected. Although most strategy development theories have the intend to be generalisable to a large variety of environments, there are limitations to the transferability of these theories. As Verreynne (2004) found, rational, analytic modes of strategy development which are successful in large firms cannot be automatically transferred to smaller firms. Indeed, due to the fact that design firms are generally SMEs or even MSEs, the application of these rational, analytical modes cannot automatically be transferred to design firms. Moreover, it is the creative, unpredictable nature of the design firms that makes the application of rational, analytical strategy processes difficult.

In this study, design and the context in which design is generated (the design firm) are related to the strategy literature. This facilitated the construction of a conceptual model that includes the most apparent influences to strategy development processes within the design sector. The outcome can figure as a basis whereupon further empirical research can be based upon. Furthermore, the conceptual model can support design firms to become more aware of the focal points for their own strategy development.

As a final point, these findings can extend beyond the design sector. As Lampel *et al.* (2000) suggest, the extensive experience the cultural and creative industries have of harmonising creativity and management, can be a valuable lesson for other industries. Indeed, the outcomes of this study give insight on the aspects that are of importance when aligning a creative environment with strategy development. Using the design firm as an example of a highly *creative* and *managed* environment, it can provide a new window on how strategy development and a highly creative environment can interrelate.

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RESEARCH AND PRACTICE IN DESIGN AND INNOVATION POLICY IN EUROPE

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According to a European Commission public consultation, the greatest barrier to the better use of design in Europe is the lack of understanding among policy-makers. Academics have provided evidence of the impact of design on economic performance; however design, unlike innovation, is not well integrated into policy. This raises the question: How can academic evidence make a more compelling case for policy-makers to integrate design into innovation policy? This research seeks to develop a framework to benchmark policies for design in Denmark, Estonia, Finland and the UK and compare what data should be collected against data that is currently available. Ultimately, this research seeks to further develop the emergent field of research in design policy and provide practical policy insight.

Keywords: Innovation policy; benchmarking; design systems

CONTEXT

Despite research by the UK Design Council (2004:3) and Danish Design Centre (2004:50) demonstrating that design can have an impact at both the micro level of the firm and as a driver of growth at macro level, design remains underrepresented in innovation policy. However, in 2010, the European Commission included design for the first time as one of ten priorities in their innovation policy (2010:3): 'Our strengths in design and creativity must be better exploited'. Innovation Union embraces design for bringing ideas to market, for innovation in both private and public services and for tackling social challenges (2010:17). Furthermore, it is the European Commission's vision that by 2020, 'design should be a well-integrated element of innovation policy across Europe' (2011:1). Policy decisions should be made on the basis of evidence and academic research has the potential to generate such evidence. With design now on the European policy agenda and already part of 15 national innovation policies across Europe, there is an opportunity for academic research to further accelerate policy practice. However, the question remains: How can academic evidence make a more compelling case for policy-makers to integrate design into innovation policy? For policy-makers and academics, a prerequisite for evidence-based policy-making is benchmarking – a process of learning by comparison. Constructing a benchmarking model to examine policies for design poses a number of challenges not least because data on design is scarce. Consequently, this research seeks to develop, on the one hand, a Theoretical Benchmarking Framework with recommendations on what quantitative data should be collected to inform policy and on the other hand, a Design Policy Monitor to qualitatively analyse what data is currently available with policy recommendations. Ultimately, this research seeks to build a body of academic evidence to advance the debate on design's role in innovation policy and demonstrate to the innovation research community that design is more than just a link in the innovation chain.

DESIGN AND INNOVATION POLICY

This section examines three fundamental questions: i) What are design and innovation? ii) What is the rationale for integrating design into innovation policy? iii) How can academic research provide evidence to influence the policy process? In examining design and innovation from a policy perspective, there are a number of challenges to acknowledge. Many of the challenges stem from the most fundamental question of how to define design and how to conceptualise the relationship with innovation. In defining design and innovation, as Hobday *et al.* (2011:5) observe, 'neither term is unproblematic and both have changed over time'. Innovation and design can be not only nouns

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(an innovation or a design), verbs (to innovate and to design) but also adjectives (an innovative idea or a designer brand). Conventionally the central tenet of design, as stated by Friedman (2000:1), has been as a ‘broad field of making and planning disciplines’ and according to Buchanan (1990:78), ‘virtually all definitions of design today are variations of this theme, each intended to draw out a different aspect’. More recently, design has been described as an approach to problem-solving. Expanding on this, Brown (2009:236) states that ‘Design, and more broadly, design thinking, can be viewed as a creative problem-solving tool that can be utilised across industries with respect to innovative products, services, processes and even societal challenges’. However, Dilnot (1984:19) and Margolin (1995:12) assert that design suffers from a lack of academic consensus, which has implications for design history, design practice, design philosophy, design research, design methodologies as well as its theoretical, political and social positions. In addition, there is an increasing hiatus between how design is understood by academics, design professionals, policy-makers and the general public.

In contrast, Cruickshank (2010:23) observers that ‘definitions of innovation in innovation studies have a high degree of commonality’. According to Nonaka (1992:96), innovation is the creation of value through knowledge and its integration into technology, products, service and across company strategy. For Bonsiepe (1995:35), the ‘objective of design activity is neither the production of knowledge nor the production of know-how, but the articulation of the interface between artefact and user’. Both design and innovation can create competitive advantage through differentiation in products, services and systems. The distinguishing factor is that innovation is grounded in an established body of knowledge dating back to Schumpter in 1934, codified in academically rigorous processes and is quantifiable while design as an academic discipline is less mature and the return on investment is difficult to isolate from other variables. Nevertheless, Cruickshank (2010:25) notes that ‘although the bodies of knowledge are highly overlapping, there is limited dialogue’. Design as a field of academic enquiry does not exist in isolation from a broader academic context; there is a need to further examine the relationship between design and innovation and make a stronger case to the innovation research community that design should form a greater part of their field. This is particularly pertinent at a time when design is increasingly being recognised as a driver of innovation policy. Innovation policy is an established line of academic enquiry while design policy is emergent.

Design forming part of the European Commission’s policy Innovation Union is part of a broader trend where the scope of innovation policy in Europe is expanding. A paradigm shift is underway where the innovation policy remit now encompasses a broader range of activities beyond purely technological, where as von Hippel (2007:293) and Bisgaard et al. (2010:2) contend, user-centred innovation, including design, is becoming more important. To align their policies with the European Commission, policy-makers across Europe at national, regional and local levels require evidence of design’s impact and the rationale for integrating design into innovation policy. According to interviews with policy-makers in Finland and Denmark, as well as micro level case studies where design has had an impact on an individual project, product or company, policy-makers require macro level statistical evidence of design’s economic performance. In 2004, the UK Design Council’s Design Index study (2004:5) tracked the share prices of 63 design-led companies over ten years and found that they outperformed the FTSE 100 indices by 205%. Furthermore, their Value of Design Factfinder report (2007:4) revealed that for ‘every £100 a design alert business spends on design, turnover increases by £225’. Despite these encouraging statistics, according to a European Commission public consultation (2009:8), the greatest barrier to the better use of design in Europe is the ‘lack of awareness and understanding of the potential of design among policy-makers’ and the second is the ‘lack of knowledge and tools to evaluate the rate of return on design investment’. While academic research such as Roy and Potter (1997:12), Borja de Mozota (2003:88) and MacBryde and Moultrie (2007:315) have made a concerted effort to address the lack of knowledge on design’s economic value, there is still further to go to match the reliability

and validity standards of government economists. Above all, policy-makers require evidence of design's role in economic growth.

Policy-makers also require a rationale for design to form part of policy. Since the 1980s, political theorists such as Freeman (1982:18) and Lundvall (1985:15) have initiated a shift in the justification for policy intervention in favour of innovation away from the neo-classical market failure theory to embrace a broader systems failure theory. The innovation research community, including Bergek et al. (2008:407) have now 'almost completely rejected the market failure approach as a basis of policy action'. According to Woolthuis *et al.* (2005:609) in the innovation system approach, 'innovation is an interactive, non-linear process in which actors, e.g. firms, interact with a manifold of other organisations (e.g. research institutes, customers, authorities, financial organisations) and institutions (e.g. IPR, regulations, culture)'. Woolthuis et al (2005:614) further acknowledge that 'most problems in the innovation system will not be uni-dimensional but will consist of a complex mixture of causes and effects, and involve several actors'. Therefore, policy-makers need to have an understanding of all components of the system in order to develop effective policies. Bisgaard et al. (2010:4) developed a model where the Danish innovation system is composed of eight categories i) innovation support (innovation programmes and pools); ii) technological service (technological institutes, tech-track); iii) innovation networks (matchmaking); iv) research (universities, research institutions and hospitals), v) education and competences (education, traineeships, further training), vi) counselling inventor schemes, patents, standards, design), vii) entrepreneurship and venture capital (scienceparks, incubators, public venture fund) and viii) international innovation (international innovation centres). Such frameworks enable policy-makers to identify those components of the system that are under-performing.

Policy intervention in favour of design can also be justified in terms of systems failure as stated by Love (2007:3), Raulik-Murphy and Cawood (2009:1) and Swann (2010:4). For example, the challenge of low take-up of professional design services among small companies is a failure that no one actor in the system could solve but would require a broader policy instrument coordinating multiple actors and initiatives. Despite mounting evidence that design can contribute to competitiveness, companies still have comparatively low awareness of what design can achieve for their business – not only in terms of the client facing side but also internal processes within the firm. According to the Design Council (2008:1), in only 22% of UK companies does design lead the development of new products and services and 44% of companies perceive design as having no importance. Low awareness of the value of design in the private sector is not surprising as design suffers from asymmetrical information; designers do not have the tools to calculate the return on investment and companies are unwilling to invest in a process when the outcome and return is unclear. In the systems failure rationale, the role of government intervention is to devise actions, programmes and policies aimed at stimulating the supply and demand for design to tackle failures in the way that actors and components of the system interact. Love (2007:5) lists 18 sub-system elements of national design infrastructures. Swann (2010:23) identified five categories to illustrate a national design system, including i) public investment in the design profession, ii) public investment in national design assets; iii) investment in financing mechanisms; iv) investment to support systems thinking and v) investment in educating end-users, companies and the public sector about the value of design. Alternatively, Raulik-Murphy and Cawood (2009:8) identify seven components of a national design system: i) design policy, ii) funding source, iii) design education, iv) design promotion, v) design support, vi) research and development and vii) professional associations. Raulik-Murphy and Cawood's model is the most comprehensive but arguably missing two key components: the professional design sector itself and investment in design by private and public actors. Drawing on both the innovation and design systems literature, this research proposes the following model of a European Design System composed of nine components divided into supply and demand: i) design investment (public and private), ii) design support, iii) design promotion, iv) design centres, associations, networks and clusters, v) the professional design sector, vi) design education, vii) research and knowledge transfer, viii) funding and ix) policy,

governance and regulation. A strategic design policy should examine each component of their national or regional system to devise actions and programmes to tackle specific challenges stemming from insufficient interaction.

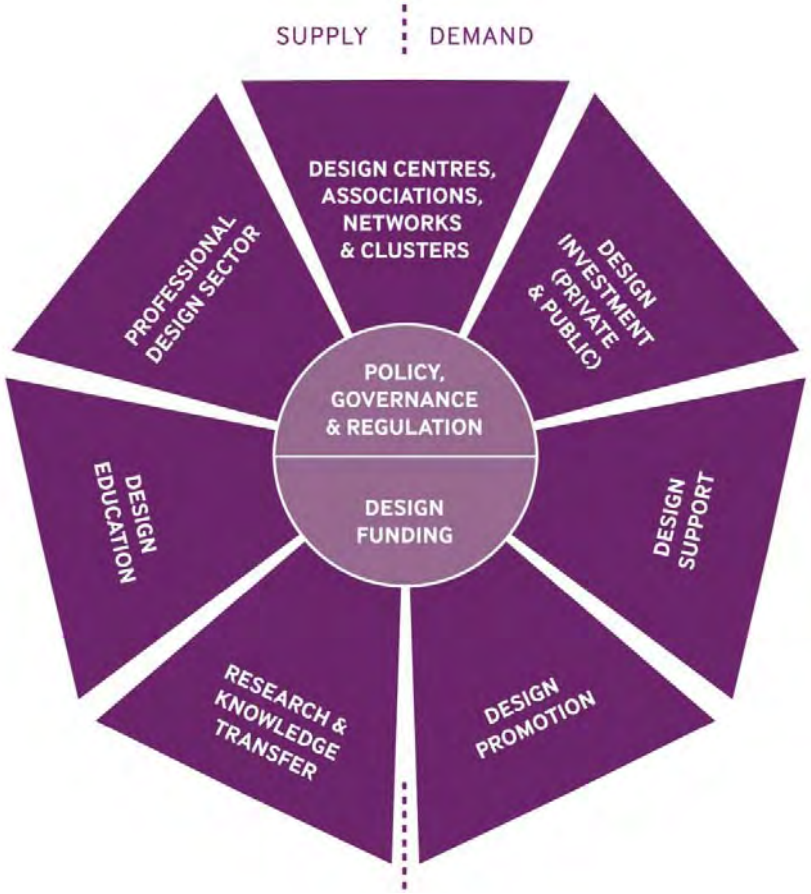

Figure 1 European Design System
Source: Anna Whicher, Gavin Cawood and Andrew Walters (2012)

Without a common definition, the rationale for integrating design into policy remains disputed. According to Choi *et al.* (2011:70), 'researchers have proposed that the purpose of a national design policy is to ensure that the appropriate design support is provided for businesses to become globally competitive'. Raulik-Murphy *et al.* (2010:53) offer the interpretation that 'although the practice of design policy is developing, the general understanding of what is involved has not kept pace with those developments'. Furthermore, Sun (2010:71) has identified that 'design policy and its deployment are largely constrained by the dynamics within the design industry and its wider context – the economy'. To enhance the role of design in innovation policies, there is a role for academic research to make a more compelling case to policy-makers.

According to the European Commission (2009:21), in many European Union countries, an 'evidence-based approach to informed agenda setting and policy adjustments is relatively weak'. Nevertheless, Huggins (2010:640) notes that 'benchmarking exercises have become increasingly popular [in Europe] in recent years, with some scholars arguing that regional benchmarking, undertaken carefully and meaningfully, is an essential prerequisite for informed and strategic policy-making'. Borras and Jacobsson (2004:187) assert that benchmarking is a methodology involving learning by comparison that can be employed by policy-makers across Europe under the EU's 'open method of coordination' to analyse policy development, implementation and impact to accelerate policy learning and the transfer of best practice. Berger (2005:4) states that 'due to the fact that benchmarking exercises are undertaken in various ways, it is difficult to come up with a single definition that covers all variations'. Many benchmarking initiatives exist for innovation policy,

including among others the Europe-wide Innovation Union Scoreboard and the Regional Innovation Monitor; however, design is usually omitted from innovation policy benchmarking initiatives even though design is increasingly part of innovation policies in Europe. While benchmarking is acknowledged by academics and policy-makers as an approach to evidence-based policy-making, Groenendijk (2004:3) warns against certain pitfalls involved such as selecting inappropriate indicators, an absence of data availability and an over-reliance on quantitative data. In developing a framework for benchmarking design policies in Europe, careful attention should be paid to the above risks. The aim of this research is therefore to develop a benchmarking framework to provide evidence-based policy insight to governments across Europe and to further the understanding of design as a legitimate domain in innovation policy research.

METHOD

This research seeks to bridge the gap between academic research and policy practice for integrating design into innovation policy. Huggins (2010:639) defines benchmarking as a methodology concerned with learning by comparison, where countries and regions examine the policies, performance and processes of their competitors in order to identify successful initiatives that could be adapted and transferred. A number of benchmarking studies exist for innovation policy-making but this approach remains under-developed for design policy-making. From the benchmarking literature, including the early 12-stage model developed by Camp (1989:23), Groenendijk's 5-step process (2004:3) and the Innovation Policy Benchmarking Guidebook (2008:16), the following framework has been employed:

i) Identifying best in the class
ii) Defining the sample
iii) Selecting participants
iv) Developing indicators
v) Assessing the relevance for policy-making
vi) Establishing data availability
vii) Refining the indicators
viii) Collecting the data
ix) Determining the gaps
x) Recalibrating the benchmarking framework

The preliminarily stage of developing the framework was to identify the 'best in the class' against which to benchmark best practice and compare performance. Performing content analysis of the 27 European Member States' innovation policy documents provided an assessment of the prevalence, scope and depth of the state of design in European innovation policy. Performing content analysis of policy documents revealed that in 2011 design featured in 15 of the 27 Member States' innovation policies including the Czech Republic, Denmark, Estonia, Finland, France, Ireland, Italy, Latvia, Poland, Portugal, Romania, Slovenia, Spain, Sweden and the United Kingdom. These references ranged from one or two sentences to entire chapters. Of course, many more European countries and regions have active design programmes, design centres and well-rooted design traditions such as Germany and the Netherlands but they do not have design articulated in a government policy document. While the statements in policy documents may not reveal the extent of implementation on the ground they nevertheless reveal key insight into government understanding of design and the value government places on design. Design's representation in policy can be categorised into a number of levels: no explicit design policy, policy for industrial design, policy for service design (private and/or public) and policy for strategic design where design forms part of a broader policy agenda. Almost half of Member States (12) do not recognise design at policy level at all. Two fifths, mostly in Eastern Europe, recognise design narrowly in terms of industrial innovation. Only seven countries embrace the role of design in

service innovation but mostly for the private sector not public services. Policies recognising the spectrum of design's contribution from industrial and product design though service design to strategic design belong to a minority of European innovation leaders.

Table 1 Scope of design's integration into European Member States' innovation policy in 2011

No explicit design policy	Policy for industrial design	Policy for service design (private and/or public)	Policy for strategic design
Austria Belgium Bulgaria Cyprus Germany Greece Hungary Lithuania Luxembourg Malta The Netherlands Slovak Republic	Czech Republic France Ireland Italy Latvia Poland Portugal Romania	Slovenia Spain Sweden	Denmark Estonia Finland United Kingdom

Those countries with design best represented in policy were selected for study: Denmark, Estonia, Finland and the UK. Selecting participants was based on the actors in the best position to provide the data. Therefore national design centres and national government departments were selected, in this case the Danish Design Centre and Danish Business Authority, the Estonian Design Centre and Ministry for Economic Affairs, Aalto University (Finland) and Ministry of the Economy and Employment and the UK Design Council (the Department for Business Innovation and Skills have been unable to participate so far).

Indicators for the benchmarking framework were derived from two sources: i) innovation policy benchmarking initiatives and ii) academic literature on national design systems combined with current data collected by design centres. From Huggins' typography of benchmarking studies (2010:648), 497 policy indicators in seven multi-regional, innovation policy benchmarking initiatives were examined to inform the development of the benchmarking framework:

Table 2 Number of indicators in multi-region, innovation policy benchmarking studies

	Project name	European regional coverage	Number of indicators
1	EMERIPA – *European Methodology for Regional Innovation Policy Impact Assessment and Benchmarking*	8	207
2	EURO-COOP – *Regional Innovation Policy Impact Assessment and Benchmarking Process: Cooperation for Sustainable Regional Innovation*	9	36
3	IASMINE - *Impact Assessment Systems and Methodologies For Innovation Excellence*	5	73
4	IMPACTSCAN – *Innovation Policy Impact Assessment at Regional Level*	7	31
5	INNOWATCH – *Application of Technology Watch Methodology for Assessment of Regional Innovation Policy Impact on SMEs*	4	61
6	MERIPA - *Methodology for European Regional Innovation Policy Assessment*	5	67
7	OMEN - *Optimal practices, development policies and predictive Models for regions in an ENlarged EU*	6	22
TOTAL NUMBER OF INDICATORS EXAMINED			497

To select the indicators for the benchmarking study, the process indicated in figure 2 below was set in place. The 497 innovation policy indicators were compiled into a 'long list' and those which could be adapted for design were added to the list of design policy indicators compiled from the academic design literature and studies by design centres. The relevance of the indicators for policy-making were then assessed in a one-day focus group in Cardiff (UK) with representatives from Estonian Design Centre, Estonian Ministry for Economic Affairs, Danish Design Centre, Danish Business Authority, Aalto University, the Design Council and Welsh Government. Interviews with the Finnish Ministry of the Economy and Employment took place prior to this. The

focus group guided the participants through four exercises intended to ensure the robustness of the benchmarking framework. Face-to-face interviews (Denmark and Finland) and telephone interviews (Estonia and the UK) also took place with the design centres to establish the extent of availability for the indicators. The feedback from the interviews and focus group was incorporated to refine the indicators. The design centre project managers and innovation policy-makers in national governments then responded to a survey to collect data according to the refined set of indicators.

Despite attempts to mitigate the risk of lack of data availability prior to data collection in interviews with design centres, there were still a number of gaps in the survey responses because data that the design centres initially perceived to be available proved too difficult to collate or were available in some countries but not others. Based on the feedback from the focus group there were performance indicators that policy-makers were keen to have but which design centres affirmed in interview were unavailable. These indicators could simply have been discarded but these were the measures which provided strategic insight into the use of design in a country. Consequently, following the two stage process, the indicators were categorised into indicators which should be collected – a Theoretical Benchmarking Framework – and indicators which are available despite not being uniformly available across the sample – the Design Policy Monitor. Innovation policy benchmarking exercises tend to be conducted in a longitudinal study over a number of years to compare policy developments; however, such an approach for design raises a number of challenges.

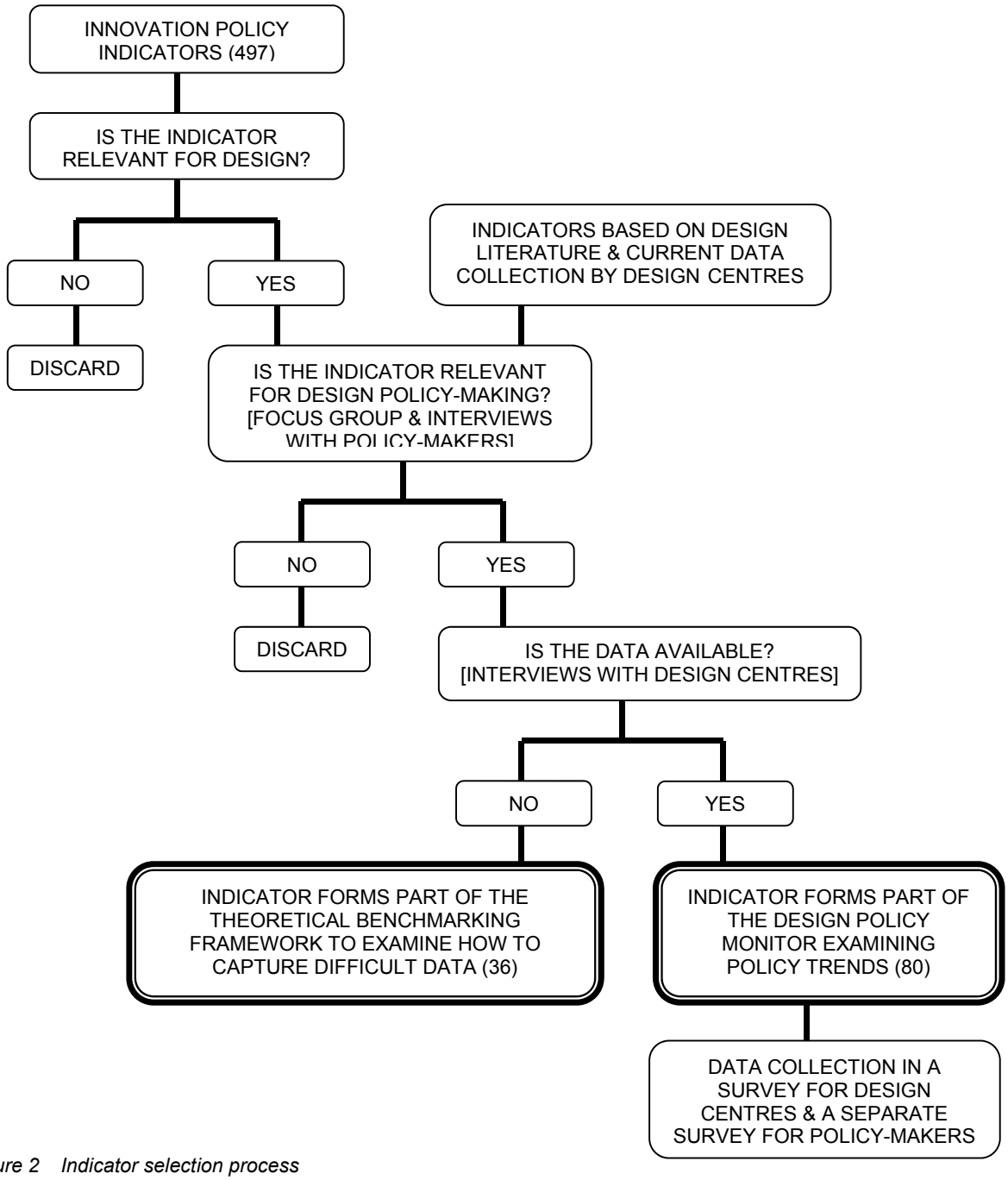

Figure 2 Indicator selection process
Source: Anna Whicher, Gavin Cawood and Andrew Walters. (2012)

FINDINGS

Initial findings reveal both barriers and opportunities for academic research to influence the policy process. A significant challenge is related to data availability to inform policy-making – i) key performance data on design is frequently not collected; ii) where data is collected, it is not collected regularly or on an annual basis; and iii) data is not necessarily comparable between countries. For example, data on companies' spending on design is costly for design centres to collect so this data only exits in Denmark and the UK. One off or infrequent surveys on employment of designers are available but for example, the latest figures for Estonia date from 2007. Furthermore, the design sectors are not always made up of the same disciplines, for example, in the UK, architects are usually considered separate from the design sector whereas elsewhere in Europe, like Finland,

architects are included within the sector. Based on these barriers, a key recommendation for the European Commission is for Eurostat and national statistics' offices to collect annual and comparable data on design. From these current gaps in data, a design scoreboard like the Innovation Union Scoreboard that assesses annual performance based on 25 innovation indicators is not appropriate and would require significant resources for new data collection. The challenges of data availability resulted in two outputs from this research, a Theoretical Benchmarking Framework with indicators that could be collected in the future and the Design Policy Monitor based on data that is currently available. The Theoretical Benchmarking Framework (figure 5) is based on quantitative indicators, which could be collected at a cost by sampling design agencies and companies and conducting interviews with design centres, public authorities and universities. In contrast, the Design Policy Monitor seeks to build a qualitative profile of design and the state of design policy according to the nine components of the European Design System to provide insight and recommendations to policy-makers.

Design investment	Design support	Design promotion	Design centres, associations, networks & clusters	Professional design sector	Design education	Research & knowledge transfer	Funding	Policy, governance & regulation
Company spending on professional design services	Spending on design support programmes	Spending on design promotion	Companies assisted	Employment in design sector	High school students studying design	Number of doctorate graduates	Value of subsidies available to support industry in using design (demand)	Number of design actions in the policy
Companies with in-house design teams	Participants in design support programmes	Articles in national press	Designers assisted	Designers with tertiary education	Higher education institutions teaching design	Academia-industry collaboration projects	Value of subsidies to support designers (supply)	Number of policy delivery actors
Public sector spending on professional design services	New spending on design by participants	Design awareness among consumers	New design clusters	Design sector gross value added	Undergraduate students studying design	Publications in top 10 design journals		Number of target beneficiaries of the policy
Design managers in public authorities		Design awareness among companies	New industry-designer collaboration projects	Export of design services	1st year earnings by design graduates	New products/ services commercialised through academia-industry collaboration		Return on the policy instruments for design
New products/services brought to market using design		Design awareness among public sector						
New public services/ processes implemented using design								

Figure 3 Theoretical Benchmarking Framework. White boxes illustrate input indicators and grey boxes indicate output indicators.

Source: Anna Whicher, Gavin Cawood and Andrew Walters. (2012)

The 36 indicators in the Theoretical Benchmarking Framework are divided according to the nine components of the European Design System and sub-divided into input and output indicators. For example, in the professional design sector, the input indicators are the level of education

among designers (designers with tertiary education) and the number of designers working in the sector (employment in design sector). The corresponding output indicators are the amount the design sector contributes to the economy (design sector gross value added) and the value of international business (exports of design services). As previously mentioned, this data is not consistently available across the sample; however, all of these indicators are available in the UK for 2009/2010. According to the Design Council's Design Industry Research (2010:2), there are an estimated 232,000 designers in the UK and 51% hold an undergraduate degree. However, figures for the gross value added (GVA) of the design sector in the UK are disputed. According to the Creative and Cultural Skills Council (2009:6), in 2009, design contributed £8.3m in GVA to the UK economy while the Department for Culture, Media and Sport (DCMS) (2009:14) estimated design GVA for 2009 at £1.8m or 0.14% of total UK GVA[*]. Furthermore, DCMS (2009:16) estimate that exports of design services represent £104m or 0.1% of all UK exports. As the majority of indicators identified in the Theoretical Benchmarking Framework are either simply not collected or not collected annually, this remains a purely theoretical model at this stage. A possible next step could be to secure funding to collect data according to indicators, perhaps in a larger sample of EU countries, by setting out a sampling procedure, data collection guidelines and interpreting framework.

Overall, the input indicators in the framework are more readily available while the output indicators, which seek to provide an insight into impact and are more relevant for policy-making, are less available. The two surveys, one among design centres and one among innovation policy-makers, collected data on 80 indicators (including some listed in the Theoretical Benchmarking Framework) to generate enough data to provide a qualitative profile of the state of design policy in the four countries. Analysis of these indicators forms part of the Design Policy Monitor, which will be conducted on an annual basis over three year. The Design Policy Monitor examines policy trends and concrete examples of good practices, which could be adapted and transferred to less experienced countries or regions. The analysis is thematic according to the nine components of theh European design system and proposes a set of policy recommendations. The policy recommendations are aimed at national, regional and local government; however, the specific actions may be better implemented by other actors, in which case it is the role of government to provide incentives (often financial) for actors in the system to comply.

DESIGN INVESTMENT

The core systemic failure a design policy should seek to address is the greater take up of professional design services in the private, public and third sectors. Innovation policy is after all is the cornerstone of economic growth and design is seeking to prove its worth in this domain. There was consensus among the focus group that indicators of company spending on design and the number of companies with in-house design team provided key insight. In the UK, Livesy and Moutrie (2008:6) estimated that UK firms spend around £50bn ($77.4bn) on design annually. In Denmark, the Economic Effects of Design research by the Danish Business Authority (2003:4) estimates that Danish companies spend upward of 7bn DKK ($1.1bn) on design each year. Furthermore, the Danish design sector has achieved 20% annual growth in the last ten years (2003:4). Taking into consideration the significant difference in population size in each country, Denmark spends marginally more on design per capita than the UK, $200 and $124 respectively. Of course, the two studies use different metrics to measure design investment so if data could be collected according to the same procedure then it is possible that the results might be different. In 2007, the Design Creates Value research (2008:23) revealed that around 16% of Danish companies have designers employed but only 1% had more than 10 designers employed. In contrast, the Design Industry Research (2010:1) estimates that 83,600 designers are employed in in-house teams, approximately 36% of all UK designers – an increase of 8% on 2005 but the study

[*] *According to the DCMS publication (2009:7) GVA is 'measured by the income generated by the business, less their intermediate consumption of goods and services used up in order to produce their output'.*

does not cover how many companies have in-house design team. Consequently, again, these figures are not comparable as they have slightly different foci. In Estonia and Finland, data on company spending on design has yet to be estimated and the respondents estimated that only a few companies have in-house design teams (possibly 40 in Finland with the two largest in-house design teams in Estonia being in the retail and traditional manufacturing sector). The gaps combined with the absence of comparative data pose challenges for policy-making; however, it is clear is that design is a significant economic sector that merits closer policy attention. Spending on professional design services by the public sector and the number of design managers within public authorities is also indicative of the value the public sector places on design. However, at this stage, spending on professional design services (whether communication or more strategic) across multi-levels of governance (national, regional and local) has yet to be estimated. However, the numbers of design managers in public authorities is small enough to capture. For example, in Denmark, Mindlab is a cross-ministerial innovation unit with a multidisciplinary team (including designers) that enables policy-makers to develop solutions from a citizen's perspective. In the UK, Cornwall County Council is the most prominent example of a design manager involved in re-framing challenges to tackle ingrained socio-economic issues. The next stage of the research is to understand the impact of design managers in public institutions.

POLICY RECOMMENDATIONS

- Collect data on spending by companies and public authorities on professional design services according to a standardised European procedure.
- Implement initiatives to connect small companies and designers.
- Provide incentives for companies to develop in-house design capabilities.
- Integrate design managers into public authorities to provide input for creative problem-solving in policy-making.

DESIGN SUPPORT

Almost every country in Europe has a design support programme. Government funded design support programmes are the primary implementation mechanism of design policies (whether explicitly part of a policy document or not). The UK programme Designing Demand and the Danish Ice-breaker programme are often used as reference points for developing new programmes – for example, the Estonian Design Centre has this year implemented a Design Bulldozer programme inspired by these experiences. However, programmes in both the UK and Denmark are in the third or even fourth iteration of their cycle. Policy-makers in Finland suggested that design support programmes now need to be more targeted to specific systemic failures. Whereas programmes tend to encourage all types of companies to participate, perhaps programmes need to be more strategic and more aligned to innovation priorities. For example, design support programmes could be more specialist and target high growth, high export, start-up or sector-specific companies such as the traditional manufacturing industry or focus on service design specifically for the private or public sectors. There is currently limited support in Europe for intellectual property and patent registration specifically for design.

POLICY RECOMMENDATIONS

- Align design support programmes with more strategic innovation policy priorities (high growth, start-up, sector-specific or high export companies or service design for private or public sectors).
- Examine broader design support mechanisms such as intellectual property, patent registration and tax incentives.

DESIGN PROMOTION

Educating a range of target audiences - the general public, small companies and public authorities - about the value of design is a costly undertaking. In Denmark, according to the Danish Business

Authority (2003:4) upwards of 12.5m DKK ($2m) is invested in design promotion each year. Among respondents, national publicity campaigns were the least popular of promotion activities as they are the most resource intensive. The most prevalent promotion initiatives are design awards, design weeks and design exhibitions. Design is most frequently reported in the Danish and Finnish media (approximately 5-7 times a month in national newspapers and once a month on national television). Design appears 2-4 times a month in national newspapers in Estonia and the UK but mostly in the context of product or fashion design in the culture and lifestyle sections of the media and very rarely is design talked about as a business process or in an economic context. Alternatively, in Denmark, design has now moved away from the cultural section of the media and is more prevalent in the mainstream business sections. However, the crucial data on design awareness among the general public and small companies is difficult to operationalise and capture.

POLICY RECOMMENDATIONS

- Develop promotion activities to target specific audiences to raise awareness of design, for example, public authorities or small companies in specific sectors.
- Monitor design awareness by different audiences.

DESIGN CENTRES, ASSOCIATIONS, NETWORKS AND CLUSTERS

A number of opportunities to support policy-making by national design centres were also revealed by the respondents. Innovation and the creative industries have been placed at the heart of economic recovery policies across Europe. Governments are beginning to recognise the contribution of design to innovation and in a number of parts of Europe design constitutes the greatest proportion of the creative industries both in terms of employment and turnover. Consequently, design centres have enjoyed a closer relationship with government departments in recent years and actors in Denmark, Estonia, Finland and the UK have successfully engaged with government to positively influence the policy agenda. For example, the Estonian Design Centre's cooperation with national government is described as 'intensive' with the centre being the main partner for the Ministry of Economic Affairs in 'drafting and implementing the national design strategy and action plan'. Design centres have a crucial role to play in delivering the actions of the government policies for design. The central role of design centres, associations, networks and clusters should be as facilitating dialogue between the sector, industry and government to respond to raise both the standard of professional design practice and its use by industry and government. For example, professional standards for design only exist in the UK and if design is to be recognised as a strategic discipline, designers need to be able to step up to the bar and perform at this level.

POLICY RECOMMENDATIONS

- Encourage design associations and networks to collect annual data on their members.
- Conduct needs analyses of the design sector and small companies to ensure the activities of design centres, associations, networks and clusters are meeting the needs of the sector and small companies.
- Develop professional design standards for the different sub-disciplines of design to encourage designers to move into new design disciplines such as service design.

THE DESIGN PROFESSIONAL DESIGN SECTOR

Statistics on the state of the professional design sector are crucial for national decision-makers to appreciate the significance of the sector, not only in terms of employment but in terms of its contribution to economic growth in other sectors. Based on 2007 statistics, the Estonian respondent reported that there are 28,000 people employed in the creative industries but less than 1,000 are employed in design – approximately 4%. The GVA of the creative industries was estimated at €7.17bn, making up 2.9% of gross domestic product. Although the value of design GVA was not calculated – respondents reported a 'moderate increase' in the financial performance

of design agencies in 2012 compared with 2011. Designers in Estonia and Finland are generally highly educated with between 60-79% and 80% respectively holding an undergraduate degree. The Finnish respondents also state that less than 1,000 people are employed in the design sector in Finland and that over 9% recruited graduate designers. Information about the profile of designers is important too, for example, whether they engage in continuous professional development, collaborate with other designers, move into new design disciplines likes service design, possess the necessary entrepreneurial skills to run a successful business, communicated effectively with industry and are equipped to deal with challenges in the public sector. Insight gleaned from interviews with the design centres would suggest that there is a huge range of competences within the sector and not all would be able to effectively engage with government and industry at a more strategic level.

POLICY RECOMMENDATIONS

- Implement initiatives to enhance the business and entrepreneurship skills of designers.
- Support designers in engaging with business associations, networks and clusters.
- Encourage designers to engage in continuous professional development.

DESIGN EDUCATION

Design education varies across Europe, in Estonia and the UK, design is taught in primary and secondary school whereas in Denmark and Finland it is not. In Estonia, design is taught in primary schools from the age of seven. Design was only recently added to the national curriculum from the first to the ninth grade as part of the arts as well as technology classes. However, teachers have yet to be trained to teach design and there is a lack of supporting material and textbooks. In the UK, in 2011, 254,000 candidates took their GCSEs (a national exam for pupils aged 15-16) in Design and Technology, with 18,200 taking A-level (national exam for 17-18 year olds). Approximately 80 higher education institutions teach design-related courses with approximately 16,000 undergraduate students enrolled in 2009. In the UK, designers have good career prospects relative to other professionals in the creative industries with the average designer earning £11.50 per hour comparing to £8.71 for the rest of the creative industries. In Estonia between 2007 and 2010, a total of 1,038 individuals received education in design, including 854 in higher education and 184 in vocational education. In all four countries, multidisciplinary higher education is becoming more popular. For example, in Estonia, there is a joint master's programme in design and engineering between Tallinn University of Technology and the Estonian Academy of Arts, which joins students from different institutions on one course. In Finland, Aalto University is a merger between three previously separate institutions of economics, engineering and art and design where 300 students are enrolled on design courses. Increasingly there are initiatives that encourage students to spend time in a design agency and in industry and to take courses in entrepreneurship. In Denmark, Finland and the UK, design students can go abroad but take-up is very low whereas Estonian design students are reported to be 'generally very active in going abroad with many also continuing their postgraduate studies abroad'. By encouraging design students to collaborate with students from other disciplines, study abroad and undertake placements, the develop the appropriate professional experience.

POLICY RECOMMENDATIONS

- Position design in the primary and secondary school curriculum as a subject that connects the STEM subjects (science, technology, engineering and maths).
- Train primary and secondary school teacher to better teach design.
- Integrate entrepreneurship skills into tertiary design education courses.
- Encourage collaboration projects between design students and other disciplines.
- Make an internship in industry and/or a design agency mandatory as part of the course.
- Encourage design students to take up mobility programmes and study abroad.
- Instil the values of continuous professional development among design students.

RESEARCH AND KNOWLEDGE TRANSFER

Research in design is perhaps the weakest component of the system in terms of both competences and government initiatives. Design research still has to catch up with more established disciplines like innovation and to develop a body of knowledge to further develop the practice itself. Design rarely forms part of government research grants or multidisciplinary research calls, despite its transformative and problem-solving capacity. There is also no European framework to assess excellence in design research. Nevertheless, knowledge transfer and collaboration between academia and industry is becoming steadily more prevalent. For example, Enterprise Estonia (a division of national government) has an innovation voucher scheme that 690 companies have used for academia-industry collaboration projects since 2009 where companies can benefit from 4,000 to 16,000 Euros. Of the 690 companies, 50 companies have used the voucher to for collaboration on design. The Aalto Design Factor enables students to collaborate on challenges in businesses, giving them practical experience of problem-solving in a commercial context. Similar initiatives also exist in both Denmark and the UK. Such initiatives give design students vital experience with industry and diffuse user-centre solutions to companies.

POLICY RECOMMENDATIONS

- Re-position design research within innovation theory.
- Encourage doctoral level research in design.
- Implement academia-industry collaboration programmes to accelerate the diffusion of user-centred solutions to industry.
- Develop a framework to assess excellence in design research and education across Europe.

FUNDING

The challenge of using existing funding mechanisms to enhance design capabilities are twofold; on the one hand, companies do not use innovation funding to take advantage of design services and on the other hand, designers do not access innovation funding because they are not familiar with the process. A multitude of innovation funding schemes exist across Europe. In the sample, while design was not ineligible in certain funding mechanisms (such as innovation voucher schemes), since design was not explicitly included, companies very rarely use the funding for design. According to the Estonian policy-maker, design is a relatively low cost way for companies to innovate; however, design should be better accounted for in innovation financing instruments to increase the take-up of professional design services. Furthermore, designers could be missing out on funding opportunities, for example to develop new products or services with the traditional manufacturing sector, as they are inexperienced with the regulations and protocols.

POLICY RECOMMENDATIONS

- Include design explicitly in innovation funding schemes such as innovation voucher schemes, seed funding, venture capital and tax incentive schemes.
- Provide subsidies for small companies' first design investment and provide support in commissioning professional design services.
- Simplify the innovation funding application procedures to enable designers to participate in realising innovation priorities.

POLICY, GOVERNANCE AND REGULATION

In Denmark, Estonia, Finland and the UK design forms part of innovation or enterprise policy. In Estonia, following a consultation process, the National Action Plan for Design 2012-2013 was launched at the end of 2011. Design also features in the innovation policy 'Knowledge-based Estonia'. The framework for the action plan adheres to the model of the European Design System in that it makes provisions for design investment by public and private actors, a design support programme, design promotion, design education, initiatives to support the professional design sector and uses the design centre and association as implementation partners. It is the first phase

of state support policy and will provide the basis of a national strategy for the period 2014 to 2020. Denmark has had a design policy since 1997, including three successive strategies with 'DesignDenmark' in place from 2007 to 2010. In 2011, the Danish Government published the 'Vision for Danish Design 2020', which is currently being translated into concrete policy actions. The vision states that by 2020 'Denmark is known worldwide as the design society. By that, we mean a society that, at all levels and in a responsible way, has integrated the use of design to improve the quality of people's lives, create economic value for businesses, and make the public sector better and more efficient' (2011:8). In Finland, design forms part of the 'Demand and User-driven innovation policy' and interviews with two representatives with policy responsibilities for design in the Finnish Ministry of the Economy revealed that the Ministry is currently developing a National Design Policy in collaboration with a steering group of 17 design actors. Between 2000 and 2005, Finland had a dedicated design policy, 'Design 2005!' and from 2008 design has been included in the national innovation policy. In the UK, design is included in the 'Innovation and Research Strategy for Growth', which states that 'Design can be transformative for companies, through leading or supporting product and process innovation, for managing the innovation process itself, for the commercialisation of science, and the delivery of public services' (2011:35). The next phase of analysis will be to examine how far the implementation initiatives of these policies address the challenges they were developed to tackle.

POLICY RECOMMENDATIONS

- Involve designers when developing policies for design, innovation and the creative industries (both as end-users but also for creative problem-solving).
- Link design policy visions to concrete actions with a clear division of tasks, financing mechanisms, monitoring procedures and evaluation processes.
- Involve designers in a multidisciplinary team to re-assess the public procurement processes to not only to give greater preference to more user-centred solutions (perhaps by involving designers) but also to increase SME access to government contracts.
- Pilot a creative policy-making lab within public authorities as multi-disciplinary research team (including designers) to re-frame policy challenges and contribute to a more-centred approach to public governance.

CONCLUSION

First and foremost, there is a gap in what data would best inform a design policy benchmarking study and what data is currently available for analysis. Consequently, this research has produced two outputs, a Theoretical Benchmarking Framework to collect quantitative statistics in the future and a Design Policy Monitor to construct a qualitative profile of design policy developments in Denmark, Estonia, Finland and the UK to highlight potentially transferrable good practices. Furthermore, this research has sought to more firmly ground design in innovation theory, provide a rationale for design's integration into innovation policy and take one more step down the road to design informing innovation policy and research. Further analysis of the preliminary findings of the Design Policy Monitor is required to construct an in-depth insight into the design systems in Estonia, Denmark, Finland and the UK but lessons can already be drawn. In Europe, funding is the single most powerful policy mechanism available to government to manipulate the innovation or design system. Of course, with budget cuts and public demand for more transparency in governance, public authorities need to do more with less. Funding is a prime incentive for governments to influence actors in the design system. Design should not receive government funding in preferential treatment over other sectors but in the context of the impact it can have on economic growth. However, definitive proof of design's contribution to macro economic performance is still absent. In response to this, the Design Policy Monitor seeks to provide practical insight and examples of initiatives that governments could adapt and adopt to their requirements. Design is increasingly gaining attention at policy levels and research on the role of design in

innovation is needed to secure design's position in future policy. This research not only seeks to develop a benchmarking study to forward design policy as a legitimate domain of study but also to engage with innovation academics to enhance the dialogue between the fields of innovation and design.

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Design-Led Innovation in Business Models

LEADING
INNOVATION
THROUGH DESIGN
2012 INTERNATIONAL DESIGN MANAGEMENT RESEARCH CONFERENCE
AUGUST 8-9 2012 - BOSTON, MA. USA
Bason, C. (2012). *Designing co-production: Discovering new business models for public services.*

DESIGNING CO-PRODUCTION: DISCOVERING NEW BUSINESS MODELS FOR PUBLIC SERVICES

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Focusing on a public sector context, the paper explores whether there are particular patterns in the changes that flow from design-led approaches to innovation. As public managers utilise design processes in their quest to re-think policies, services and organizations, do new business models for public service provision arise as a result? The paper shows how design processes can lead to more *co-productive* business models for public service provision, which build systematically on the skills, motivation and resources of end-users and other key stakeholders. It is argued that design-led innovation may help public sector organizations achieve better outcomes at less cost, but that it will require significant changes to the inner workings of government.

Keywords: Design-led innovation; co-production; public sector.

TOWARDS DESIGN FOR PUBLIC VALUE

The economic, financial and social crisis in most Western economies is putting public managers under almost unprecedented pressure to deliver more value while reigning in cost. From Europe to the UK and the US, austerity measures have been put in place which leave no doubt that governments will be severely cash-strapped for the foreseeable future. Meanwhile, "wicked" societal challenges abound, which require smarter solutions in increasingly turbulent, complex and interdependent societal and human settings (Churchman, 1967; Rittel & Weber, 1973; Ritchey, 2011).

This growth in both turbulence and complexity has been associated, perhaps coincidentally, by an increasingly systematic exploration of what design can do for government. Over the past decade, public sector organizations in countries such as Australia, New Zealand, France, Denmark, the UK, Canada and the United States have to varying degrees and in different forms taken up design approaches as a tool to drive innovation and change (Boland & Collopy, 2004; Parker & Heapy, 2007; Bason, 2010, Dunleavy & Tinkler, 2012). Just within the past year, public organizations in the United States (Office of Personnel Management) and Australia (Department of Industry, Innovation, Science, Research and Tertiary Education) have set up their own Innovation Labs and Design Centres.

The application of design in the public sector is none the less still highly emergent and points to the flexibility, if not the indeterminacy of design, so that "much confusion surrounds design practice" (Heskett, 2002:2). Disciplines such as service design, which focuses on (re)designing service processes, or experience design, which focuses on designing a particular user experience,

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are being tested out in settings from hospitals and social services to strategic policy development in a number of countries (Bate & Roberts, 2007; Shove et. al., 2007; Sanders & Stappers, 2008; Bason, 2010; Boyer, Cook & Steinberg, 2011). But what happens when design is applied in such contexts and to what extent does it really drive innovation? This paper explores the impact of design in a public sector context. More specifically, it focuses on potential shifts in the underlying business model of many public services, from a model that is largely designed around the *delivery of services to people*, towards a model that is designed to better enable *co-production of services with people*. The wider public management context can be viewed as a shift from a classic 'bureaucratic' model over the 'new public management' to what has more recently been termed 'networked governance'. (Hartley, 2005). As Botero et. al (2012) state in their recent publication on peer-to-peer production of public services, "There are changes taking place in how the role of citizens in society is experienced – in terms of how they feel responsible for things happening – and also in what is expected from them."

If this is truly an emerging trend, could design have something to do with it, or even amplify it?

ABOUT THIS PAPER

This paper is part of a wider doctoral research tentatively titled 'Designing governance'. My research interest is descriptive and explorative in character. It focuses on the thoughts, interpretations and actions of public managers in and around various events and settings associated with the use of design as an approach to driving innovation.

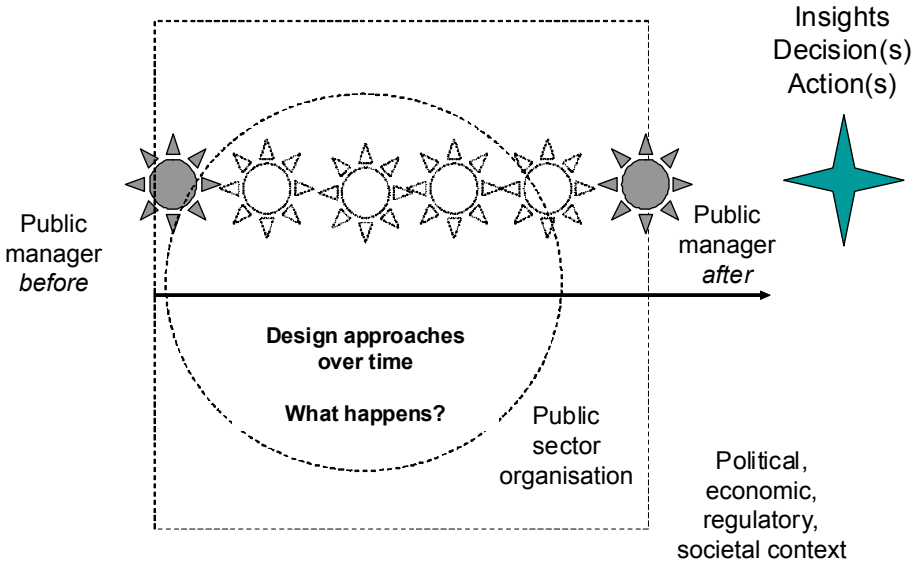


Figure 1: Research approach

The specific research questions addressed in this paper are: *What is the significance of design methods for public managers? Might design-led approaches lead to new business models for public service provision?*

Methodologically the paper takes inspiration from Corbin & Strauss' (2008) grounded theory approach to qualitative, explorative research. The emphasis is on eliciting meaning from qualitative empirical data, discovery, identification of patterns, and establishing conceptual 'building blocks' that can lead to theory. As Blumer (1969: 26) points out, concepts "are the anchor points in interpretation of findings". I am thus conducting theoretical sampling, understood as the collection of data from places, events and people that will create opportunities to 1) develop concepts in terms of their various properties and dimensions, 2) uncover variations, and 3) to identify relationships between key concepts (Eisenhardt 1989; Corbin & Strauss 2008).

LOOKING FOR DESIGN IN PUBLIC SERVICES

How do you identify the use of design? In the late 1960s, Herbert Simon proposed that design can be understood as the human endeavor of converting actual into preferred situations (Simon, 1969). As Richard Buchanan of the Weatherhead School of Management has proposed, design can be thought of as *a liberal art of technological culture*. In this definition, design is viewed as an integrative, supple discipline, "amenable to radically different interpretations in philosophy as well as in practice" (1990, p 18). Current developments in design certainly seem to show that design has not one, but many shapes. According to Buchanan, design affects contemporary life in at least four areas: Symbolic and visual *communication*, the design of material objects (*construction*), design of activities and organized services (*strategic planning*), and finally the design of complex systems or environments for living, working, playing and learning (*systemic integration*).

This paper takes as a point of departure that design methods may be applied for all these four, and possibly other, ends – but it is in the areas of *strategic planning*, or service design, and in *systemic integration*, or policy design, that my emphasis is placed.

More specifically, the approach has been to identify and study individual public managers who have had key responsibility for, or the opportunity of, utilising design to address certain problems, opportunities or to create one or more new solutions or actions within public policies or services.

To identify a sample of managers who have utilised "design approaches" within the public sector in recent years I have used multiple resources, building on my own vantage point in MindLab, the public sector innovation unit I run in Copenhagen. The empirical material has been collected from the parent ministries of MindLab; from *the design community*, including organizations such as design councils, design industry associations, leading service design firms, design schools and academic research institutions; from *government organizations*, such as local government associations, national ministries and agencies; and finally from *innovation and design researchers* at institutions, centres and think tanks. The criterion for choosing a manager for interview has been that some combination of design approaches have been applied, usually labelled explicitly as "service design", "co-design", "co-creation" or "strategic design". Typical methods involved have been ethnographically inspired (design) research such as participant observation, shadowing, open-ended qualitative interviews; a variety of workshop or co-design processes involving public employees, managers and often citizens or businesses (end-users); and a varied use of visualisation techniques, often facilitated by professional designers.

A total of 15 qualitative personal interviews have been carried out to date with public managers at national and city level in Denmark, the UK, Australia and Finland, covering a wide range of public service domains. Additionally various secondary material (reports, web sites, presentations) have been included in the research. The interviews have all been audio recorded, transcribed, and where relevant translated from the original language into English by a professional translator.

STRUCTURE OF THE PAPER

This paper is structured around four key findings that have emerged from the qualitative analysis of the interview material. The findings are in many respects interrelated, but none the less they seem to have each their unique expression and attributes. Each finding builds on a broader pattern in the research, but is exemplified in this paper by a main example, anchored around a manager's experience of a design project. Where relevant I supplement with additional examples.

The first finding concerns how design approaches seem to cast a new light on the relationship between the state and citizens – what characterises it, how managers understand it, and how their perception of it is challenged through design research.

The second finding is closely related; namely an emerging shift in perspective from focusing the organization's efforts on activities (tasks or work processes) to outcomes (the changes flowing from these activities).

The third finding addresses which kinds of value flow from the changes triggered by design approaches, and shares some tentative findings concerning impact on user experience, productivity, outcomes, and democratic engagement.

The fourth finding relates to how this all blends into the emergence of new business models of public service provision: Design approaches seem to help public managers emphasise the user over the system and outcomes over the process, thereby reshaping public service provision from a mode of production *to* citizens to production *with* citizens: co-production. This section includes an analysis of the change logic of design in public service organizations, and the particular contribution of design approaches in triggering change.

I conclude the paper with a brief consideration of challenges flowing from co-production and potential new research agendas.

FINDING 1: TOWARDS A NEW SYSTEM/CITIZEN RELATIONSHIP?

> *There is [an image of] a staircase that goes up a hill with tiles, and it is very well constructed. ... And then beside the fine staircase there is a muddy path that people walk by. And it was a bit like what happened here. ... it is a really good picture of how our users actually went by a different path than the one we wanted them to walk on. And so, instead of trying to get them forced onto our path, we will have to follow them. It worked well for us to have that picture.*

This quote is by Christina Pawsø, a social worker and manager of *Camillagaarden*, an institution in the city of Odense in Denmark, which provides a sheltered working environment for adult mentally disabled persons.

THE CHALLENGE

Christina Pawsø's observation about the staircase versus the muddy path is interesting because it essentially concerns the relationship between citizens and the state. Pawsø reflects on how the current relationship between government organizations and citizens is very much designed around top down decision-making and implementation. Citizens, in particular "vulnerable" people such as adults with a mental disability, are often perceived, and cast, as passive recipients of public services.

Using the metaphor of the staircase versus the muddy path, Christina Pawsø explains how public employees and professionals have knowledge about how to operate in the system (bureaucracy, hierarchy, paperwork, procedures, 'helping'), while citizens have knowledge about what motivates and engages them in their everyday life context (relationships, experiences, meaningfulness). Pawsø points out that both sides of this equation have their own knowledge – but it is a knowledge that isn't necessarily being shared.

More generally the interviews indicates a pattern that decision-making in public service organizations is usually based on what makes sense at the top, and largely ignores the complexity at the bottom. At Camillagaarden, this used to be the case even though the manager and staff work very closely with the users. Services were organised around one-way communication that missed out on feedback loops and that did not appreciate the potential in the everyday interactions between staff and citizens. In this respect it perpetuated a relationship that was inefficient. In Pawsø's words, the staff attitude was roughly "We come [to work] and we must pass the time until we go home". The key challenge faced by Christina Pawsø, who stepped in as a young new manager, was how to change such an attitude, to create a more fruitful relationship between staff and users, and generate better outcomes.

THE CONTRIBUTION OF DESIGN

In 2008-2010, Christina Pawsø and her colleagues worked a professional design team to facilitate a different kind of dialogue between management, staff and the citizen-users. In a joint project with Local Government Denmark, an interest organization for municipalities, and the service design firm '1508', the managers and staff at Camillagaarden were trained to apply design approaches such as cultural probes, photo diaries, prototypes, service analogies, testing and ideation to explore new ways of involving and engaging citizens.

Through the year-long use of design in Camillagaarden, Christina Pawsø and her staff began to build a different kind of relationship with the users. The highly interactive methods allowed citizens to visually articulate their hopes, dreams, aspirations and concrete personal stories about what a good experience at Camillagaarden was about, and how it could be made better. The staff built on these inputs to fundamentally redefine their professional role from experts to coaches and facilitators. According to Pawsø:

> *Before it was much more so that we were the tour leader, and so we went ahead with a flag, just follow me here. And now it is more so that we go a step behind, and sometimes we go up the side of the person, for we are no more experts at something than they are.*

The citizens are now actively involved as the true innovators, coming up with new ideas every day, and driving the formation of various interest groups that pursue the activities and services they find the most fun and rewarding. User satisfaction and everyday engagement has skyrocketed and the number of users has gone up by nearly 30 percent (without additional staffing), to the point that the institution now has a waiting list for the first time in its 40-year history.

The shift has thus been towards a much more reciprocal, mutual relationship where staff sees its role as a collaborative one. The work is about shaping outcomes, such as quality of life, in real-time. An example of how this changed relationship works in practice at Camillagaarden concerns a group of citizen-users who once were thought of as a disruption, or trouble makers. They were labelled by staff as the 'corridor runners', because they preferred to spend time roving around the corridors and hallways of the institution, rather than engage in activities with the other users. As part of the design process, this group was also involved, and the engagement challenged the staff to re-think how to make group sessions more interesting for everyone. Pawsø says of the 'corridor runners': "They did not bother to be in the groups, because it was boring, so they ran out in the corridors. This was always the case for maybe 20% of the users. But where we previously had said, how do we get them to stay in the group, now we think, 'well what is it that is so exciting out in the corridor? We managed to turn the perspective in that way." As a consequence, Camillagaarden now has no corridor runners, but rather a broader range of activities, including physical activities which appeal to those who are too restless to work on hand crafts all day.

A related example, also from the empirical research, is from Adelaide, Australia. Here the Families Administration collaborated with a design team from The Australian Centre for Social Innovation, and a public manager from the department, Carolyn Curtis, was seconded for nearly eight months to the project. The objective was to redesign services for "chaotic families" that are typically characterised by high levels of alcohol abuse, violence, unemployment, and general dysfunction. Using a combination of in-depth field research, virtually living with the families, combined with rapid prototyping of new potential solutions, the project strived to find new opportunities for helping them to become "thriving families". The resulting, new approach to helping chaotic families in Adelaide is described as a 'resourcing model', which is radically different from how she has worked during her 10-year career as a manager. Says Curtis:

> *It is bottom-up, it has end-user focus, and there is no fixed structure, criteria or categories. The work has been extremely intensive. We have focused on motivation and on strengths within the families – identifying the 'positive deviances' where some families are actually thriving, even though they shouldn't be, according to the*

> *government's expectations. We have focused on finding entry points and opportunities, rather than just trying to mediate risk. It is a co-design, or co-creation approach, and it has been entirely new to me ... today we as administrators meet the families reactively. We are trapped in a culture of risk. I can see we need a mindset change in my profession. We are forgetting to see the potential. We are lacking openness and passion.*

SHIFTING THE RELATIONSHIP

The managers Christina Pawsø and Carolyn Curtis, from vastly different public institutions in Odense, Denmark and Adelaide, Australia, respectively, both experienced a shift, or the beginning of a shift, in the system-citizen relationship, catalyzed by design methods.

In their 1994 book *Designing Interactive Strategy*, Normann & Ramirez argue that there are three types of relationships in systems of value-creating actors – such as the system of an institution for adult mentally handicapped, or one for dealing with families at risk: 'Pooled relationships', in which each part of a system comes together to forms a whole; 'Sequential relationships' where sections of an organizational system produce outputs to a sequential process; and finally 'reciprocal' relationships, which are the most complex and which in reality characterize most service-producing organizations.

It seems reasonable to argue that the changes in the perception of the relationship between end users (adult mentally disabled persons, vulnerable families) and public service organizations can be characterized as a shift toward recognizing that essentially, the relationship is (or should be) a reciprocal one. Normann & Ramirez (1994:30) state that "*Co-production* is the term we use to describe the 'reciprocal' relationships between actors...", and they elaborate (1994:54) that "this view implies that the customer is not only a passive orderer/buyer/user of the offering, but also participates in many other ways in consuming it, for instance in its delivery."

In the next section I take a closer look at another way in which design seems to redefine what it means to "produce" a public service.

FINDING 2: FROM PROCESS FOCUS TO OUTCOMES FOCUS

> *It is an eye opener ... it is more concrete. [The design process] has made me aware that there are some things we have to look at. ... So far we have been describing a service to citizens, not giving them one.*

This observation is made by Ms. Anne Lind, the Director of the Board of Industrial Injuries (BII) in Denmark. She explains how she had had the sense that something in her organization needed to change, but she could not be precise about what it was. But to her, leveraging design approaches to better see how her organization's services impact citizens, has been "a shift in perspective".

THE CHALLENGE

The Board of Industrial Injuries is a government agency in Denmark and part of the Ministry of Employment. The responsibility of BII is to handle worker's injury claims and ensure that the case management is legally correct, so that insurance settlements (which are generally paid by private insurers) accurately reflect the degree to which citizens have lost their ability to work. It has also historically been a key emphasis in the organization to ensure highly efficient case management. Tools such as lean management (Toyota production system), team-based work and performance-based remuneration, and the introduction of digital systems in case and workflow management, have been used extensively in BIIs pursuit of increased productivity.

Meanwhile, in the period 2007-2012, BII has also collaborated with various designers, including from MindLab, a government-run innovation unit that is part of the Ministry of

Employment, and *Creuna*, a private service design firm, to explore how its services are experienced by citizens. The methods included ethnographic field research (contextual citizen interviews recorded on video and audio) as well as numerous workshops with staff and management, development of persons for a range of ideal-typical users, and seminars and conferences where various insights and results from the design projects have been shared internally amongst staff and externally amongst stakeholders such as local government, trade unions, insurance firms, health care organizations, etc.

The quotes above concerning a shift in perspective reflect a questioning by Ms Anne Lind, the Director: What is the ultimate contribution of an organization such as the BII? It is to efficiently handle the case process to settle insurance claims and payment in accordance with legal standards, or is it to produce some kind of longer-term outcome for citizens and society?

THE CONTRIBUTION OF DESIGN

Through the design process, Anne Lind initiated a strategic shift in her organization, from focusing mainly on handling insurance settlements, to helping people return to the labour market. Amongst the initiatives to underpin this change is the strengthening of a “travel team” which works with local governments to quickly settle cases and rehabilitate injured workers back into work, improved online digital services that enable citizens to track their case progress, and a newly established Citizen Service Centre which provides a more individually tailored and comprehensive service, starting with citizen’s needs. The underlying movement can be viewed as a paradigm shift (Kuhn, 1962), as it shifts the attention of the BII from focusing on producing processes (correct case management) to producing outcomes (return to labour market). Flowing from the experience of the highly user-oriented design work, Ms. Linds organization now focuses on leveraging people's own, and system, resources to help injured workers get re-trained and find a job again.

Seeing how outcomes concretely are manifested from the point of view of citizens has been a key starting point, and an emotional driver of this change. Some of the first interviews with citizens, which were video-filmed in the context of their own homes, were, according to Lind, an eye-opener. To staff, it was almost chocking to learn that although their case management was perhaps legally correct, citizens experiences it as confusing, bureaucratic, and sometimes nearly meaningless. A universal finding seemed to be that the overwhelming amount of paperwork tended to get people caught up in the work injury process to the extent they felt they *were* the work injury. As a result, the case management process in some instances made people more ill than they were already. ”It has been good, but it has been tough”, in Anne Lind’s words. At first, the staff needed a lot of attention from her, simply because of the emotional challenge of realising that their work was in some cases doing more harm than good. This substantially challenged their world view.

In terms of methodology, using such qualitative research was a major departure from past practices, and one which allowed the organization to design different responses. According to Lind, the main research method had previously been quantitative satisfaction surveys: ”When we made a user survey we made a nice action plan to follow up ... we then piled additional information onto the users.” One could argue that the previous mode of problem-solving did not simplify the service production process, but actually made it even more complex for both the system and for users, without addressing the real question of how better outcomes are created. As a consequence there was a real risk that citizens were cast in a role as passive recipients that feel helpless and a slave to the process, while the system was attempting to become ever-more efficient at a process that created dysfunctional outcomes.

A similar example was found when Helsinki Design Lab (HDL), a design-led organization in Finland, conducted a week-long studio session on education and the problem of high school dropouts (Boyer et. al., 2011). The studio started with the emphasis that the KIDS were dropping out. However, by the end of the highly interactive design process (problem-framing, field visits, workshops), the Studio ended by emphasizing that the SCHOOLS were not providing an environment conducive to the various education types.

As discussed in relation to Finding 1 above, professionals have difficulty understanding why users do not go through their process correctly; but users have stalls, missteps, quits and complaints because the process does not consider the contexts, complexities and subjective experience of their lives. This in turn further slows down the process and creates more work for the professional. Users feel annoyed, dissatisfied, demoralized, bored, let down by the process. In the case of BIIs work, the design approaches helped Anne Lind and her organization flip assumptions on their head. Seeing how the process was dysfynctional from an outcome perspective, the underlying assumptions in the business model were challenged.

The design work helped the agency get to questions such as: What is best for the users? What do they need? What is the purpose of this service? How might we be more preventative? At BII, this has also led to a comprehensive review of which resources are really available in the system, including in the health care institutions, in local government, and in insurance companies. By focusing on the desired outcomes, the Board has launched a dialogue with these stakeholders about how to help users make a better life based on what best suits their situation. Just like in Finland, the design studio on education helped decision-makers see that the problem might not be the citizens' process (of dropping out), but the outcomes of the entire educational system.

SPOTLIGHT ON OUTCOMES

As public managers leverage design to see for themselves how outcomes are created in practice, they begin to ask questions about the underlying purpose of their organizations. Hereby they start rethinking how value is created.

The outside-in view of user experience that is provided by design exposes the entire network of actors, including citizens, that can take part in value-creation. Normann & Ramirez (1994) characterize this as a process of reconfiguring, so that actors come together to co-produce value via what they call not a value chain, but a 'value constellation'.

In the case of BII, the design projects helped Anne Lind see how her organization can work systematically to re-align a range of actors such as other authorities, health care providers, and insurers, to produce more value with citizens. Ultimately, this allows for a much more coordinated way of helping citizens back to the labor market; the ultimate outcome of the agency's work. In the terminology of Normann & Ramirez (1994:54), this is "an effective offering", and it is "designed in such a way so that partners end up performing he 'right' activities for them, engendering value creation on both sides, or rather *all*, sides".

FINDING 3: STEP-CHANGE EFFICIENCY GAINS

> *If we succeed with this, thus creating something that is understandable and synchronised with day-to-day operations, the daily practice, I am pretty sure we will achieve greater user satisfaction. In addition, you will see that the public sector saves money because compliance would be higher. So you will get more of the most basic outcome ... And because companies will make fewer mistakes and understand it better, they will not always return with incorrect reports or a lot of questions. That means that the businesses will save a lot of money, they will be more satisfied, you will get higher efficiency of regulation, and the public sector will save money.*

This statement by Sune Knudsen, Head of Division at the Danish Business Authority (DBA), was articulated in connection with an ambitious design project that aimed at making it easier to register a new business in Denmark.

THE CHALLENGE

The project addressed a specific government requirement: The selection of a *branch code* which is the statistical industry category to which the business will belong. However, the DBA knew that many business owners become frustrated and spend undue amounts of time figuring out what code to choose (to many of them, selecting a code is not merely a question of statistical categorization, it is making a choice about their businesses public identity). In addition, nearly one-third of all new businesses in Denmark end up registering a code that does not accurately match what their business does; this leads to error in the government systems; and because for instance the Food Safety Administration, the Ministry of Taxation and the Work Safety Agency use the codes to plan and execute controls (including on-site visits) to businesses, the knock-on effects on administrative waste and error are rather huge.

Sune Knudsen engaged designers to use a range of ethnographic techniques to study how business owners experienced the online registration, and how various public agencies internally dealt and collaborated around the branch codes. Building on insights about user experience outside and inside the system, designers then carried out iterative prototyping of web mockups, testing them with end users. The design team, consisting of a digital agency and the innovation unit MindLab, then created a working model for a new website to handle branch code registration, as well as a knowledge management system for administrative staff, to ensure quick knowledge-sharing across the different public agencies.

Sune Knudsens comments highlight a pattern in a number of the instances that are part of the empirical research: That the solutions flowing from design-led approaches, when implemented, hold a potential for significant improvements in public value. According to Cole & Parston (2006), “public value” is increased when public service organizations are able improve efficiency (productivity) while at the same time improving outcomes. In my own work (Bason, 2010) I argue that in addition to productivity and outcomes, the value of innovation in the public sector should also include user (citizen) satisfaction and in democratic elements such as participation, empowerment, transparency, and accountability. In fact, the engagement of citizens might in itself lead to increased value. As Pestoff (2012) points out,

> *Sometimes governments attempt to involve their citizens in the provision of goods and services, either for reasons of improving efficiency of public services, effectiveness of public policies, or to promote other important social goals, such as citizen empowerment, participation and democracy.*

DESIGN FOR PUBLIC VALUE

What kinds of public value is potentially generated by design approaches? Taking a closer look at the quote by Sune Knudsen above, he expects that his design project will make the branch code registration easier and more satisfactory for business owners, ensure better outcomes in the form of more accurate registration (compliance) with the codes, and he expects that the public administrators will save time answering questions about the codes and will have fewer errors in planning and executing controls. An externally produced business case study of the project confirmed that these types of value could be expected, to the extent that the cost of the new web-based solution would deliver a saving in time and money for both businesses and the public administration to the tune of approximately a 1:20 ROI over three years.

Going back to the case of *Camillagaarden*, the institution for adult mentally handicapped, manager Christina Pawsø similarly notes an actualized gain in productivity which flowed from the changes in the relationship with citizens. Not only has the institution added 30 percent more users with a fixed number of staff, and increased satisfaction. She gives the example that on average there is one social worker to eight users at Camillagaarden. However, with the right type of engagement of the users, a staff of two can easily facilitate 30 users over several hours at a time. That’s approximately a *doubling* of productivity. Pawsø explains how this is made possible by

leveraging the resources and motivation of the individual user: “If you are put into a frame where all your resources are being used instead of everything you are having trouble with, then you can also help others. And this also gives value to the individual.”

FINDING 4: DISCOVERING CO-PRODUCTION BY DESIGN

The discovery of a new and more reciprocal relationship with citizens; the shift from managing processes to managing outcomes; and the realisation that more public value can be created in terms of increased productivity, better user experience as well as improved outcomes and engagement; these three findings point to a fourth one: That design-led innovation can lead to the discovery of *co-production* as a new business model for public service organizations.

In this section I briefly discuss how co-production is defined, and what it entails for public service provision, before turning to an analysis of how design approaches can lead to such a redefined public service model.

CO-PRODUCTION BACK IN VOGUE?

The notion of co-production is by no means new. In fact, the term was originally coined in the early 1970s by the later Nobel Laureate Elinor Ostrom. According to Pestoff (2012:16) she developed the term to describe the “relationship that could exist between the ‘regular producer’ (such as street-level police officers, social workers or health workers) and their clients, who wanted to be transformed by the service into safer, better-educated or healthier persons.”

What might be new is the depth of the economic crisis governments currently find themselves in, and thereby the need to identify different, better and (not least) cheaper ways of getting things done. Co-production promises this by leveraging other resources than those of the public sector. Pestoff (2012:15) points to four ways in which this can basically happen:

> *First is the promotion of greater volunteering. Second is the growth of new and different ways to involve users of social services as co-producers of their own and others’ services. Third is the spread of new techniques of co-management and co-governance of social services, where the third sector plays a more prominent role in various European countries. Fourth is the development of user councils or other forms of functional representation at the local level to engage users in a dialogue about public services.*

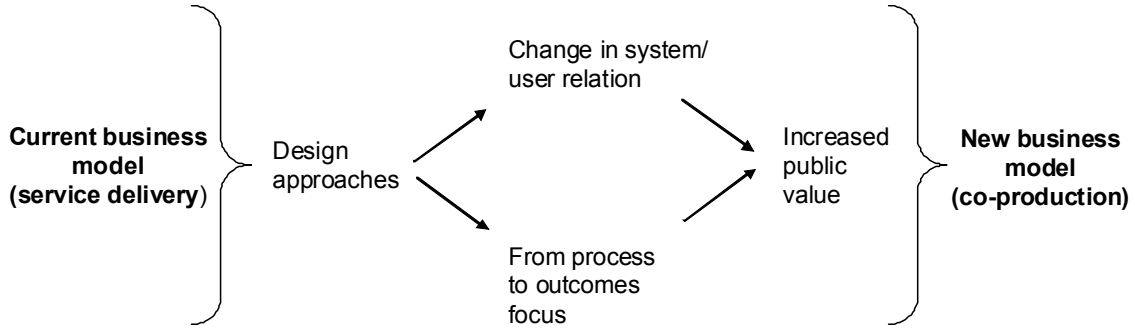
While all of these approaches to public sector reform utilise resources beyond those of government, it is only the second notion that is defined as co-production – and that is also the main focus of this paper. Over the last couple of decades, various more elaborate definitions of co-production have been offered. From a US perspective, Dr. Edgar Cahn defines co-production is a framework and set of techniques used by social service organizations to enlist active client participation in service programming (Cahn, 2004). Building mainly on UK experiences, Boyle and Harris (2009:11) describe co-production as “delivering public services in an equal and reciprocal relationship between professionals, people using services, their families and their neighbours. Where activities are co-produced in this way, both services and neighbourhoods become far more effective agents of change.”

FROM A REEXAMINATION OF ASSUMPTIONS TO A NEW WAY OF DOING THINGS

This paper has shown how various design approaches (user research, co-design processes, prototyping, experimentation, visualization, etc.) have triggered new and different approaches by public managers to their organization’s service provision. A common denominator for these new approaches has been the notion of co-production of public services; or in other words, an innovation of the business model of government. Although the term is not new in the academic world, it seems that co-production is experienced as a fresh approach by the public managers. In the cases I have researched, the new mode of production radically shifts the relationship between

the public service system and citizens, it changes the emphasis from tasks and processes to outcomes, and the new models appear likely to generate more public value. This change logic can be illustrated as follows:

Figure 2: A change model for the impact of design in public services



How does the model work?

Put bluntly, it firstly seems to work because the current business model is dysfunctional. Seddon (2008) argues that today's model of public service provision (still) largely rests on a command-and-control system of management, which holds a contractual view of the relationship with citizens. As Normann & Ramirez (1994:28) point out, current services are designed around "delivery", building on a value chain approach. This assumes that the world is simple and linear, rather than recognizing that today's social world is highly fluid, dynamic and interdependent, and that "...a service is the result of a complex set of value creating activities involving different actors working together at different times and locations to produce it for and with a customer".

Public service organizations, including the ones covered in the present research, rely to varying degrees on outdated, often standardized processes and technologies that tend to render them out of touch with the citizens or businesses they seek to serve. There is a sense of 'good enough' (bare-minimum) services instead of 'thriving' or 'transformative' services that help individuals engage in a reciprocal way, and which generate the changes in behaviour and outcomes that were the original intention. Traditional efforts to engage at-risk groups like adult mentally handicapped or chaotic families are unable to make a real impact in people's lives. Meanwhile, public service professionals largely go through the motions of processes that have been in place for decades, instead of asking "how can we do this better?"

All of this generates unnecessary failure demand, triggered by the inability to help the user get the job done right the first time around. Organizations such as the Danish Business Authority and related agencies have to expend significant resources dealing with the consequences of the original failure to ensure a smooth and accurate registration of new businesses. Not only does the system fail at producing desired outcomes, by doing so it becomes even more inefficient. There is a scarcity of public value creation.

Secondly, design approaches provide a different set of tools and ways of working systematically with innovation in government. Qualitative, ethnographically-inspired design research; highly interactive and tangible workshop formats; visualisation and rapid prototyping; user testing redesigned services; these are in many ways novel approaches to policy and service innovation. Perhaps due to the very hands-on, concrete and engaging character of (good) design work, the process simply gives more energy to staff than many other approaches. As one manager, the Head Nurse of a major Danish hospital says in a research interview, comparing a design project

with a recent lean management experience: “lean processes are quite excellent, but they do not provide any energy, you see. It is excellent for some things, but it is not real fun.”

In particular, and thirdly, the change model appears to work because (drawing on design approaches) it starts by exploring in detail how the system/user relationship is shaped very concretely in terms of space, time and interactions. This holds a disruptive potential because public managers are given the opportunity to view the results of their organization’s efforts in a new light. In an interview in *Harvard Business Review*, on discovering new business models, Rita Gunther McGrath of Columbia University says:

> *The first step is to build mechanisms that cause you to reexamine your assumptions. One question I encourage people to ask is, What data would lead us to make a different decision? Be sure you’re not getting only information that confirms your preexisting beliefs. Then you can think about what nontraditional information to seek out. You need to get unfiltered information by talking to customers directly and by going through the experiences they go through. You want to get out of the room, in other words.* (Cliffe, 2011)

There is a rather systematic finding across the empirical data that the voice of the citizen, however it is captured through audio or video (but preferably by such ‘live’ media), is a crucial trigger for change. It can be termed ‘professional empathy’ (Bason, 2010), because qualitative research seems to power an empathetic, engaging, but still professional, (re)connection between public service staff and users. As Anne Lind, Director of the Danish Board of Industrial Injuries (BII) said, “it is an eye-opener”. Or as Peter Gadsdon, Development Director in Lewisham in the UK, where staff used video to film each others client engagements in homelessness services, says: “[The methods had a] profound effect on staff because it changed their view on the service they were providing”.

What is especially eye-opening is, fourthly, how user experiences are tightly connected to the very creation of outcomes. In an institution for adult mentally handicapped such as Camillagaarden, where engagement and thriving *is* the desired outcome, positive user experience and a co-productive relationship with staff is the key to positive change. Getting businesses to comply with abstract statistical requirements requires that the Danish Business Authority establishes an interaction design that makes doing the right thing easy. And to help injured workers back to the labor market requires that the Board of Industrial Injuries designs a meaningful, individualized service process that builds and nourishes people’s physical and mental healing and identity to the point where they can re-boot, re-train and re-enter the world of work.

Fifth, the managers who have applied design approaches indicate that they expect to harvest some significant improvements across the key dimensions of public value: Increased productivity, higher user satisfaction, better outcomes, and more democratic involvement. Although the evidence is clearly patchy, there is a pattern in terms of the opportunity for a triple or even quadruple win: That by redefining relationships and understanding outcomes, systemic failure can be heavily reduced and waste and redundancy limited.

CONCLUSION: CHALLENGES TO CO-PRODUCTION?

Due to their highly user-centred and practical orientation, design-led innovation approaches appear positioned to help public managers uncover new configurations of government action, which can be labelled broadly as co-production. Thus, as Boyle et. al. (2008, 2009, 2010) as well as Pestoff (2012) argue, co-production appears to have the potential to address many of the challenges currently facing public sector leaders.

The paper’s findings from interviews with public managers thus contribute to building a theory of design for innovating public service provision. The findings also contribute potentially to further development of design practice, as it illustrates whether and how design can help the public sector

drill down to the core of the issue, uncover root causes to problems, find ways to better serve citizens and save public sector resources.

However, such a radically different business model also poses new challenges to existing practices, routines and cultures. Here are a few that may be considered for future research, and where it would be interesting to examine whether design approaches could help along the path to successfully realising co-production:

- New professional identities for public service staff: How to make the transition from 'helper' to 'facilitator'?
- If co-production leads to a need for fewer human resources in public organizations, would design projects with a focus on co-production be like asking staff to make themselves unemployed?
- Will users want to co-produce? Although the findings point to a positive shift in the system/citizen relationship, is there such a thing as too much reciprocity? Will citizens revolt and demand that they just 'receive' service for their tax dollars?
- What characterises the management role under a business model of co-production?

It may be that design has not only helped place co-production back on the public sector reform agenda; it may trigger a renewed research agenda as well.

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USING A DESIGN LED APPROACH TO EMOTIONAL BUSINESS MODELLING

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Prototyping is an established and accepted practice used by the design community. Prototypes play a valuable role during the design process and can greatly affect the designed outcome. The concept of a *business model* prototype, however, is not well understood by the design and business communities. Design industry trends indicate a move away from product and service innovation towards business model innovation. Therefore, it stands to reason that the role of prototypes and prototyping in this context should also be considered. This paper is conceptual and presents a process for creating and enabling business model prototypes. Specifically, the focus is on building emotional connections across the value chain to enable internal growth within firms. To do this, the authors' have relied on personal observations and critical reflection from multiple industry engagements. The outcomes of this critical reflective practice are presented and the opportunities and challenges for this approach are discussed. Future research opportunities are also detailed and presented within the context of the emotional business model.

Keywords: Design Led Innovation; Prototyping; Emotional Business Models.

INTRODUCTION

There is no shortage of literature and opinions regarding the value of 'innovation' to a firm's growth and long-term sustainability. However, literature surrounding the term 'innovation' encompasses multiple meanings, applications and approaches. This has led to a broad spectrum of understanding within industry and academic communities. The Doblin group, in their ten types of innovation study, highlight that firms identify innovation with the development of new products, but it was shown that innovation at the product level provides only a small competitive advantage and the lowest return on investment (Doblin, 2011). Nearly fifteen years on, it is the authors' opinion that this thinking still dominants the broader business community and limits the potential of a firm's innovation efforts.

Constant changes in the global economic environment requires companies to revisit traditional assumptions about how businesses create and capture value (Teece, 2010). Therefore, business models and business model innovation have been a focal element of discussions in management practice and literature (Amit, Zott & Massa, 2010; Johnson, Christensen & Kagermann, 2008). Novel research (technology) is of little value if it is not exploited via a differentiated business model. However, developing a novel business model to capture the value from technologies is not a trivial task, for start-ups nor for established firms (Chesbrough, 2010).

As firms begin to build awareness of the different types of innovation strategies, new tools, processes and firm capabilities will be required to enable the company to transform to adopt and

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embed these approaches within their organisations. This will require changes at both the operational and strategic levels of the organisation. The Design Led Innovation (DLI) framework developed by Bucolo and Matthews (2011) provides one approach to allow firms to reframe their innovation efforts and to move beyond a product only strategy. Key to this approach is the ability of the firm to build deep customer insights through co-design. These insights are then evolved with their internal and external stakeholders, and mapped as innovation opportunities to all aspects of the business. What is evident from firms who have engaged in this approach is the ability to rapidly move beyond product only innovations and into business level innovation. This approach has been published previously with the opportunities and challenges of embedding this approach detailed and discussed (see Bucolo & Matthews 2011).

More recently it has been identified that the DLI approach can be enhanced through a stronger engagement with a customer's emotions, both at the product and service level and within a new business model. There is an abundance research into design and emotion outlining many important findings and implications for product design, but much less on services, and even less or next to none on business models (Hassenzahl, 2010; Desmet, 2002; Hekkert, 2002). Further, there are various tools and methods for designing for emotional experiences from an industry perspective (Kujala, Roto, Väänänen-Vainio-Mattila, Karapanos & Sinnelä, 2011; Desmet, Overbeeke & Tax, 2001).

Emotions occupy all aspects of daily life including moods, cognition, behaviour, attention, perception and memory (Russell, 2003). Consequently, they influence and affect aspects of everyday activities and interactions between people, the environment, and products and services that surround them. Norman (2004) states that emotion is fundamental to all human behaviour and urges that it be infused into every aspect of the design process – what about infusing it into every aspect of a business model? How do you derive design and emotion as a business capability, not just a product capability? As the business model of a firm constitutes multiple value creation processes, which is partly; branding, service model, funding, distribution and activities, the need to better understand the relationship between innovation and business model innovation is critical.

Through a series of critical reflections based on recent industry projects, the authors' use a combined framework to identify the role prototypes and prototyping play in the success of a firms adoption of a design led approach. The outcomes of this process are documented in the following sections. Following this, the authors' propose an approach of how to create and enable business model prototypes. They do this by focussing explicitly on a firms' capacity to build emotional connections across the value chain. It is argued that this process is imperative to enable growth within firms.

BUSINESS MODEL

'Business model' is defined in existing literature in a variety of ways; as a statement, a description, a representation, an architecture, a conceptual tool or model, a structural template, or a method (Amit, Zott & Massa, 2010). There is no consistent definition of what a business model is. However, the key components of a business model are described as highlighting the notion of value (value stream, value proposition), monetary and financial aspects, and aspects related to a firm's exchange relationships (e.g. delivery channels) and competencies and activities (Chesbrough, 2006; Teece, 2010; Margretta, 2002; Zott & Amit, 2010). It is widely agreed that the notion of value is central to any business model (Teece, 2010).

Presently, the term 'business model' is ubiquitous and central to modern management practices (Margretta 2002; Johnson, Christensen & Kagermann, 2008). Although business models have always existed, the concept business model has been of increasing interest to practitioners and academics alike since the mid 1990's. All businesses either explicitly or implicitly employ a particular business model that describes the value creation, delivery, or capture mechanisms it employs (Teece, 2010). As such, new business model designs have to fit into the competencies of

a company; they must fit the launch schedule, marketing brief, manufacturing bill and funding model. Any new design that does not take each one of these into account will face many barriers to market. Norman (2010) claims, that the innovators job is not over until all of these barriers have been taken into account so that the entire system will work smoothly. He states that "Innovation is a systems issue; it is not about product or process, but the entire system" (Norman, 2010:40).

The link between system level innovation, as a source of business model innovation, and the role of the prototype, to better understand opportunities and challenges, will now be discussed. However, this issue spans both business and design literature, therefore, a fundamental question needs to be addressed. From the literature there is evidence to suggest that a conflict between the value of design and business practices exists within organisations. Author's such as Martin (2007) state that this is because the reliability drive of business versus the validity focus of design plays out in the relationship between the two and creates tension. Part of this tension exists because business people are rewarded when budgets are met, hitting financial targets and proving in advance incentives will succeed. Designers on the other hand posses an inherent bias towards validity, seeking deep understanding of the user and the context (Martin, 2007). It is suggested that a way for business and design to get along is to appreciate the legitimate differences, empathise, seek to communicate on each other's terms, use tools both sides are familiar with and change comfort zones (Martin, 2009).

PROTOYPING

DESIGN PROTOTYPING

The significance and benefits of prototyping have been long recognised in the field of design. Schön's (1983) reflection on action paradigm provides a useful foundation to better understand the nature of design practice:

> *A designer makes things. Sometimes he makes the final product; more often he makes a representation... He works in particular situations, uses particular materials and employs a distinctive medium and language… There are more variables – kinds of possible moves, norms and interrelationships of these – that can be represented in a finite model. Because of this complexity, the designer's moves tend, happily or unhappily, to produce consequences other than those intended. When this happens the designer may take account of the unintended changes he has made in the situation by forming new appreciations and understandings and by making new moves. He shapes the situation, in accordance with his initial appreciation of it, the situation 'talks back' and he responds to the situation's reply. In a good process of design, this conversation with the situation is reflective. In answer to the situation's reply, the designer reflects in action on the construction of the problem, the strategies of the action or the model of the phenomena, which have been implicit in his moves* (Schön 1983:78).

The nature of the discovery within the design process is what Schön refers to as reflection, which the authors' suggest, points to the value of prototyping. The work of Polanyi (1998) and Ehn (1988) indicate that discovery is intensified and can be observed during early stage or conceptual design activity. Both works refer to design as a process of making new discoveries by constructing alternative futures. In all three approaches (Ehn, 1988; Polanyi, 1998; Schön, 1983) the interaction between the designer and their artefacts during this phase of design activity is viewed as a contributor to discovery and new knowledge. This description can also be used to frame the designer as they move between the abstract and physical worlds. The transition between these worlds forming the space for innovation to occur. This contrasts the business community's understanding of the role of 'prototype'.

BUSINESS MODEL PROTOTYPING

Business literature acknowledges that in order to create novel business models, prototyping is imperative (Davenport, 2009). However, when prototyping is discussed in this context, the focus is generally on the testing of a pre-defined set of hypotheses rather than the iterative learning and

exploration of new business model options. Rather than using the term ‘prototypes’ and ‘prototyping’ the business community uses ‘experimentation’ when referring to business models. This has leant itself to the scientific notion of setting up experiments to control and manipulate certain variables of the business model to test a hypothesised outcome via empirical observations of data (e.g. such as usage data, market share, etc.). ‘Experimentation’ represents a scientific method and is widely used in empirical science in order to test existing theories or new hypotheses in order to support or disprove it. Scientific experiments require rigorous research planning and implementation in order to verify and validate a hypothesis based on empirical data and observations. In social science, in particular, experiments are generally difficult to implement because variables can be difficult to control (de Vaus, 2001). As an extension to this, Biddle (2012) asks, how do you prototype a business model? He describes it as a quantitative description of the various interrelationships of the business model elements – in essence, this is a financial model. Despite this the idea of business model prototyping allows for assumptions to be made, which is why the business model prototype serves a dual purpose. First, the prototype helps explore various scenarios and stress tests the viability (and profitability) of the venture so designed. Secondly, it forces firms to state up-front all potential assumptions.

The different perspectives between the two communities (design and business) regarding the role of the prototype, directly links to Martin’s (2009) description of the conflict between the designer and business community. Key to this analogy is the ability for the prototype to move between the abstract and concrete world, as well as, move from internal to external stakeholders. To overcome these cultural barriers, the Design Led Innovation framework (Bucolo & Matthews, 2011) has been further developed to help firms maximise their innovation efforts, which is discussed in the following section.

CONCEPTUAL FRAMEWORK

The Design Led Innovation framework (figure 1) illustrates that within any business a varying scale exists between operation and strategic activities. Business activities also have an internal and external dimension. Different departments within an organisation are tasked with these different activities and have specific targets, dependant on their functional role within the organisation. The model uses the term ‘opportunity’ or ‘proposition’ as the central goal, which binds all aspects of the business together. As the design concept matures, all aspects of the business are informed by, or have the ability to, inform the opportunity, creating change and growth.

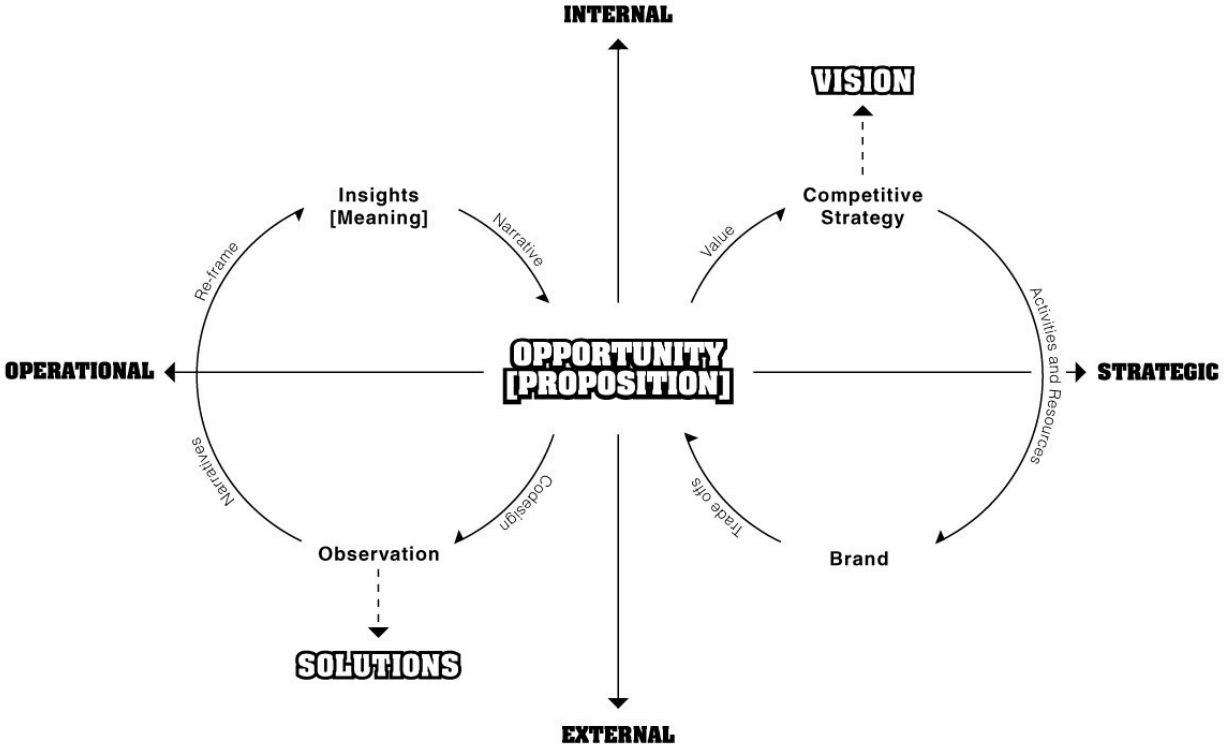

Figure 1 Design Led Innovation Framework

Previous iterations of this framework focused on the organisational capabilities required (Bucolo & Matthews 2011) to enable this multi-dimensional approach to be enabled within a firm. However, reflecting on the instances where this model has been deployed, the notion of the prototype and the level of prototyping required has emerged as a critical success factor to a firm's overall innovation success when deploying the DLI approach. As shown in figure 2, the notion of prototyping within the Design Led Innovation framework is often constrained to the top left hand corner. This is where designers focus on working within the internally and operationally focused dimensions or abstract world to generate new ideas based around given constraints that are generally provided to them. From a business perspective, the other form of prototype lives within the external and strategically focused dimension, or concrete world, and focuses on 'experiments' of know problems. In both instances the prototypes are used to create alternative visions of the future. However, it is the introduction of a third prototype, which allows for both sources of new knowledge to be integrated. The authors' refer to this new prototype as the integrated business model, which consistently seeks to integrate knowledge from the abstract and concrete worlds to test assumptions and to build new knowledge.

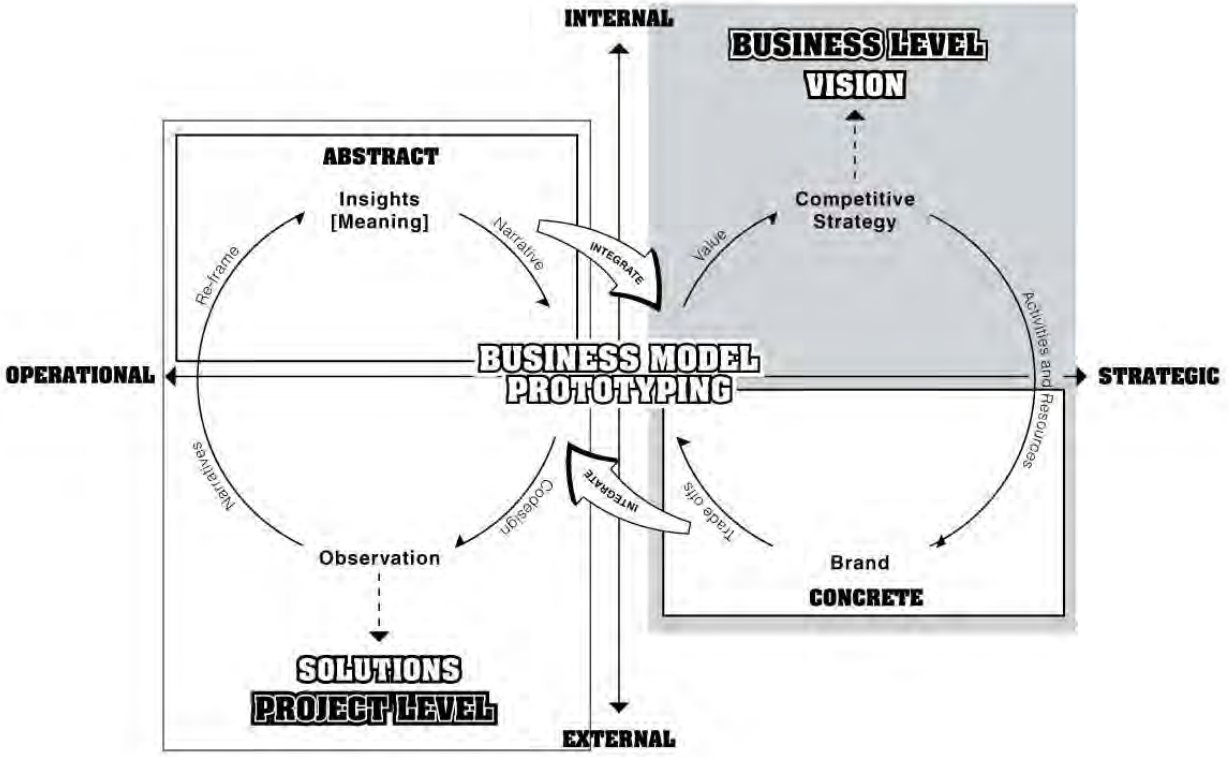

Figure 2 Design Led Innovation Prototyping Project and Business Levels

However, this approach is limited. As illustrated in figure 2, this prototype can easily remain as a combination of these two dimensions. This means the level of engagement with external customers and internal strategically focused stakeholders are avoided. Therefore, an additional level of engagement is needed (figure 3). As illustrated in figure 3, the integrated business model prototype is actively explored with external and internal stakeholders.

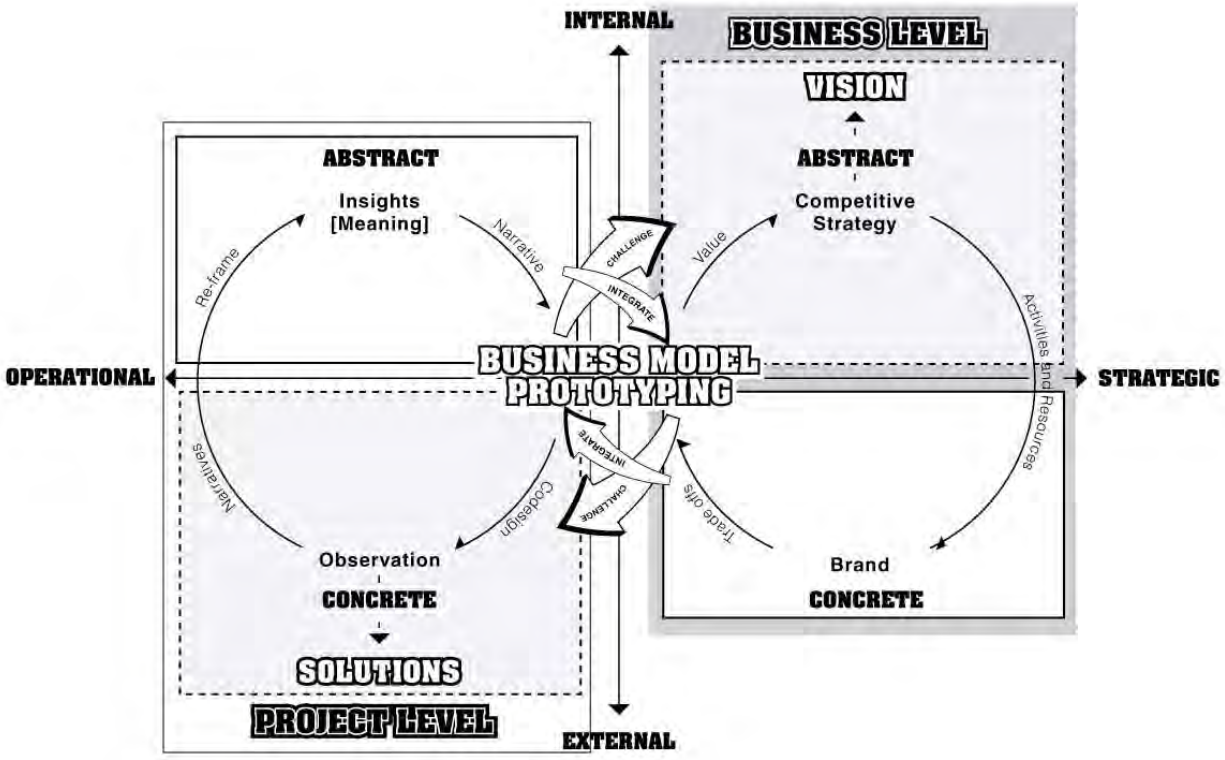

Figure 3 Design Led Innovation Integrated Business Model Prototype

Our observation indicates that firms are often reluctant to take integrated business models to the market for exploration. Firms feel they lose control of the intellectual property or are unable to manage expectations within the market. This is because the prototype is more than a product concept – it is a business model. Often these fears come from a lack of understanding of how to take such a proposition to the market or what questions to ask external stakeholders. The same issue applies at the other end of the spectrum of the integrated business model prototype. This includes using the prototype to reflect company strategy, as well as challenging strategy, to better inform the prototype. Here, the issue is not *how* to undertake such a challenge, but *who* has the authority to implement this task.

The discussion thus far extends the notion of what constitutes a designed business model prototype. The authors have challenged that prototypes can only belong in the abstract or concrete worlds and that the conglomerate value is high (figure 2). However, there is value in evolving this integrated prototype further, taking it to an additional level of engagement, to refine the business model (figure 3).

DEVELOPING DEEP CUSTOMER INSIGHTS

To develop a viable prototype, deep customer insights must first be developed. This is a critical part of the process. There are many ways this information can be gathered and analysed to provide a sound platform for prototype development. In the Design Led Innovation approach, the development of the “Emotional Touch Point Timeline” is encouraged to allow firms to firstly identify and then better understand the needs of their stakeholders (figure 4). The timeline illustrates a series of touch points. Firms start in the centre and are asked to identify their end user or consumer and to detail what task they are undertaking, how they feel for that particular interaction and why that feeling may occur. The timeline is then populated to both the left and right of this centre touch point and firms are then encouraged to expand their level of understanding from their know perspectives of customer interaction. For example, firms are asked to look at two or three

activities before a product is used, they are then requested to identify the motivation to purchase the product. From this new insights can be gained and opportunities developed. Key to this model is a firms' ability to separate out the functional requirement for each touch point opportunity (top half of timeline) from the emotional aspects (bottom half of the timeline).

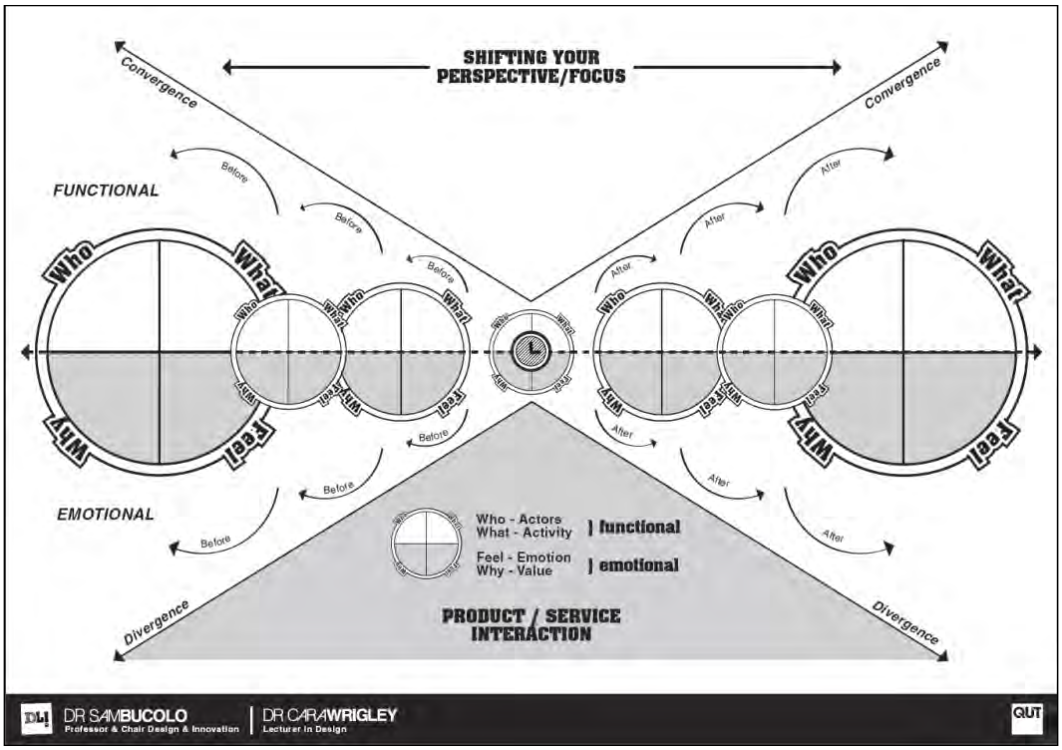

Figure 4 Emotional Touch Point Timeline

However, when deploying this approach, it has been observed that firms have difficulty in providing the same level of granularity to the emotional aspects as they do for the functional requirements. Therefore, the insights often lead to product *only* specifications from which the prototyping process described above remains constrained.

Firms are encouraged and challenged to complete the emotional aspects of the timeline to the same level of detail as they would for the functional requirements. This then provides a platform to allow for an emotional prototype to be developed. This enhances the level of customer differentiation for that particular business model opportunity. Applying insights to the Design Led Innovation framework (figure 5), the "Integrated Emotional Business Model" prototype can now be explored and mapped to the company's activities. The result or outcome of this is an emotion business model opportunity that clearly links the functional aspects (product or service) of the business model to emotion aspects of the customer value chain. The representation of this opportunity is expressed using a modified version of Osterwalder and Pigneur (2010) business model canvas.

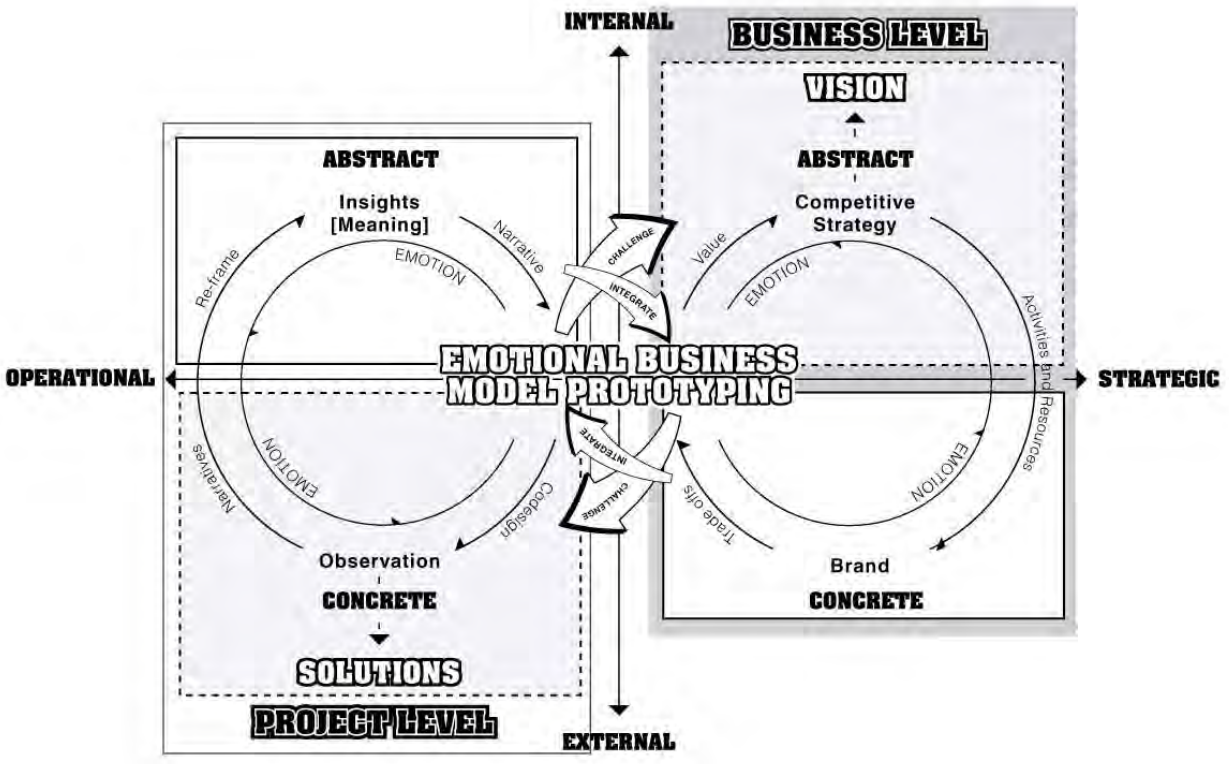

Figure 5 Design Led Innovation Emotional Business Model Prototype

OBSERVATIONS

The approach to business model innovation described in this paper has been explored in a variety of contexts and settings. However, it should be acknowledged that this a preliminary model at an initial stage of evaluation. The authors plan to continue to develop this approach based on continuous industry engagement and feedback. The observations to date have informed the development and have been positive and encouraging. However, throughout this process challenges have been identified, raising a number of questions regarding the role of prototyping within a business model context. Firstly, the notion of prototyping to generate new knowledge, compared to evaluating existing paradigms, is not widely understood at a business model innovation level. Firms see the value of traditional design prototyping at a product and service level of the firm, but prefer to use experimentation for the business model elements.

To help firms overcome these biases, the risk mitigation/idea maturity graph (figure 7) has been developed. As illustrated in figure 6, the risk mitigation/idea maturity graph is used to indicate when certain behaviours should be deployed and to identify expected value. The two lines depicted in figure 7 represent idea maturity and risk mitigation. The goal of this prototype is to reduce the gap between these two curves at the initial stage of the project, and to widen these at the latter stages. To achieve this, the initial stage of the project relies on ideation, development, multiple prototypes and provoking stakeholders. Whereas at the latter stages firms are required to adopt business case experiments in order to validate the business model trough quantifiable measures. By deploying the approach described above and combining this with an understanding of the value of the prototype, many firms are able to build a shared language and can begin to move beyond preconceived ideas (which may reside in design or business communities). Overcoming these preconceived barriers has been identified as a critical factor in the success of a firm's ability to adopt a design led innovation culture.

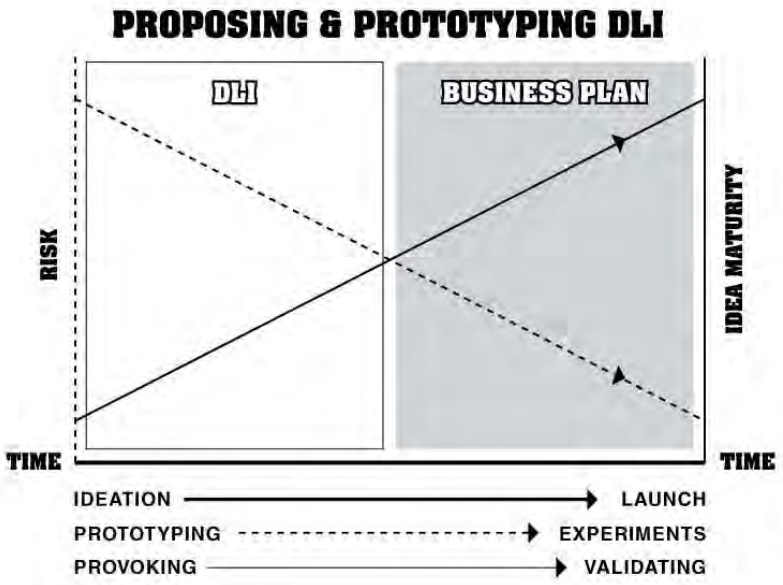

Figure 6 Design Led Innovation Risk Mitigation and Idea Maturity Graph

CONCLUSIONS

The role of prototyping for business model innovation has been explored within this paper. It is clear that this is an underexplored area of research and requires urgent attention from academic and practice communities. Firms need to transition from focussing on product level innovation to encompassing the entire business model. To facilitate this process a Design Led innovation framework has been proposed and detailed. However, when deploying this framework within firms, it has been found that the role of the prototype can be prove challenging to innovation. These challenges span multiple levels and include:

- Moving beyond abstract and concrete worlds
- Reluctance to generate new knowledge with external and internal stakeholders through the integrated business model prototype
- Emotion connections must be built into all stages of the integrated business model. Firms need to shift from focussing purely on function representations.

Through this preliminary investigation, additional questions have been raised which will frame future research activities. It is evident that a gap in knowledge at the firm level regarding the need to innovate the business model is evident. However, it remains unclear on how best to identify this gap in knowledge. Moreover, what education programs should be required to address the capability gap and which stakeholder is best placed to lead such an initiative? Should this initiative be driven from the academic community, consultants or professional bodies or should a combined approach be considered? Finally, when firms take the initiative to move from a product centric – to – business model approach, who leads this transition and what support is required from the academic and business communities. Within the coming months, the authors aim to build upon these initial research findings by exploring and addressing the questions raised within this paper.

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INNOVATING BUSINESS MODELS WITH PINBALL DESIGNS

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Many companies see the need to rethink their ways of doing business, in particular under the pervasive influence of Internet business. Design can play a prominent role here, as a way of expanding from a linear, rational conception of business model development. But rather than proposing 'design thinking' as an abstract approach, this paper shows how design materials (as used routinely in the design profession), when introduced in a business context can engage a cross-disciplinary circle of stakeholders and challenge them to reconsider their business assumptions. We will show how 'tangible business models' – for example in the form of pinball-like contraptions – encourage participants to play with hypotheses and experiment with scenarios as a way of innovating business models. In a sense this is 'design thinking' with hands and body.

Keywords: Business models; design materials; participatory innovation

INTRODUCTION

A business model is a simplified representation of the company's business logic: How it makes money through its products or services. 'Every company has a business model, whether they articulate it or not' (Chesbrough 2007) - it defines how the company creates value for the customer, and how it ensures there is a profit to be made. Business literature claims that conscious discussion of business models within the company, and with suppliers and customers is necessary to ensure competitive edge - and that continuous experimentation with business model alternatives is required to stay on the edge.

In recent business model literature there has been a move from analytical approaches towards new ways of talking about not just 'what is' but also 'what could be'. For example McGrath (2010) advocates a discovery-driven approach because more and more businesses no longer can create 'sustainable' competitive advantage but instead need to focus on what she calls 'temporary' advantage. This implies that a continuous hunt for new business advantages is required – similar to the constant development of products and services. Forty years after Rittel's introduction of the term '*wicked problems*' to characterise design work (Rittel *et al.* 1973, Buchanan 1992), we can now suggest to look at business models from a similar perspective and therefore as an area of interest for design. In the light of that it makes sense to explore through experiments what design can offer in the quest for new business model advantages. As business models are dynamic – when a company makes a change, customers and competitors react – we see here a particular opportunity for design with its contemporary focus on users and interaction. Our research is rooted in the field of *Participatory Innovation,* which expands the notion of 'users' to a broad circle of

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stakeholders who can potentially contribute to innovation and which includes ‘business’ as an active target for design effort (Buur & Matthews 2008).

Recently we completed such a participatory design experiment. We guided managers of a regional media company and an amusement park to expand their thinking about their own business model, by building a *tangible business model* with simple design materials. We introduced the metaphor of a pinball game to challenge them to think of customers’ purchase as dynamic processes, which are highly difficult to predict and control. The media company was focused on devising an online news service to attract football fans, while the amusement park had a desire to increase sales to existing park guests. The idea of the pinball game came about as an attempt to provide design material that has a dynamic quality to it, yet is flexible to allow modifications on the spot.

Figure 1 How do we start? A team of amusement park managers and researchers are getting ready to build a pinball business model.

It was a half-day event, with 16 participants altogether from the two companies, from other businesses and from the business and design departments of the university. To begin the event, a manager from each company described business challenges they face. We then guided the seminar participants through a series of business design activities of, for instance, mapping their value networks (Buur & Mitchell 2011) and staging their business relations (Ankenbrand 2011). The pinball activity was the finale of the day. We split the participants into two teams, formed around the managers of each company. We challenged the teams to build a model that would explain how to expand their business. A sloping tabletop with railings was provided, along with cardboard materials and marbles (Figures 1). Both teams managed in 30 minutes to complete a pinball model, in which balls rolling down the slope would represent customers navigating ‘market obstacles’ and purchasing services. In the process they got to discuss important issues relating to their business model development and the company managers expressed great satisfaction with the outcomes at the end of the day.

How does this relate to the prominent discussion of design thinking in the business field? Simon stated in *the Sciences of the Artificial* that ‘management resembles because it, too, is the process by which we devise courses of action aimed at changing existing situations into preferred ones (Simon 1969). Boland et al. in 2004 suggest shifting away from traditional analytical approaches to management by incorporating a ‘design attitude’; Martin claims ‘in the future, the most successful businesses will balance analytical mastery and intuitive originality in a dynamic interplay that I call *design thinking*’ (Martin 2009). Although the introduction of ‘design thinking’ to business and management practices may be an important paradigm shift, we are convinced that design can offer so much more than the ‘thinking’: Design is about *making;* design thinking is informed by making and vice versa. Gorb already in 1986 proclaimed ‘that not many managers accept that artefacts dominate their world and need to dominate their thinking’ (Gorb 1986). We like to see the tangible business modelling activities as design thinking with hands and body.

RESEARCH METHOD

This work is based on action research, i.e. experiments in on-going participatory innovation projects in which we engage participants in trying out new collaborative methods. In this case we compare two sessions, in which mixed groups of 7-8 business people, designers and researchers built a tangible business model of how they see the business of, respectively, a new media service

and an amusement park. We recorded the activities on video, transcribed the conversations and studied actions using interaction analysis. By comparing incidents across the two sessions we are able to explain how the design material scaffolds the discussion of new business models. In this paper we will first discuss the pinball models as *design objects* – how do they represent business models? Then we will study the *design process* – how do the teams socially construct meaning with the design material, and how do the participants' different perspectives come into play?

THE PINBALL BUSINESS MODEL AS DESIGN OBJECT

Let us first look at the two models built by the teams as design objects (Figures 2 and 3). The basic design idea is the same for both: marbles rolling down a slope towards a receptacle represents potential customers and their purchase. On their way, there are obstacles and guides that can divert the rolling balls in one direction or another. Each obstacle designates a business feature, and is placed and angled in such a way as to give the balls a particular direction. On both models there are two receptacles at the bottom of the slope.

The media model (Figure 2) has 'New football site' and 'Competing media' as goals. The football fans (balls) are directed towards purchase of the new product by a 'Football archive' with old news coverage, by 'Daily videos from football training', and by 'In-depth interviews with the players' – all news components that the media producer believes to have unique value for the fans, and that cannot easily be copied by competitors. Directing the balls away towards competing solutions is one barrier saying 'Quotes stolen by competing media' – as the media manager explained, *'There is a poor citation culture in national press, which means that some parts are stolen from us by competitors'*. As the team comes to realise, the new product also needs an attractive incentive (the 'X-factor') to lure customers to actually pay for the service – perhaps a monthly VIP event with the football players.

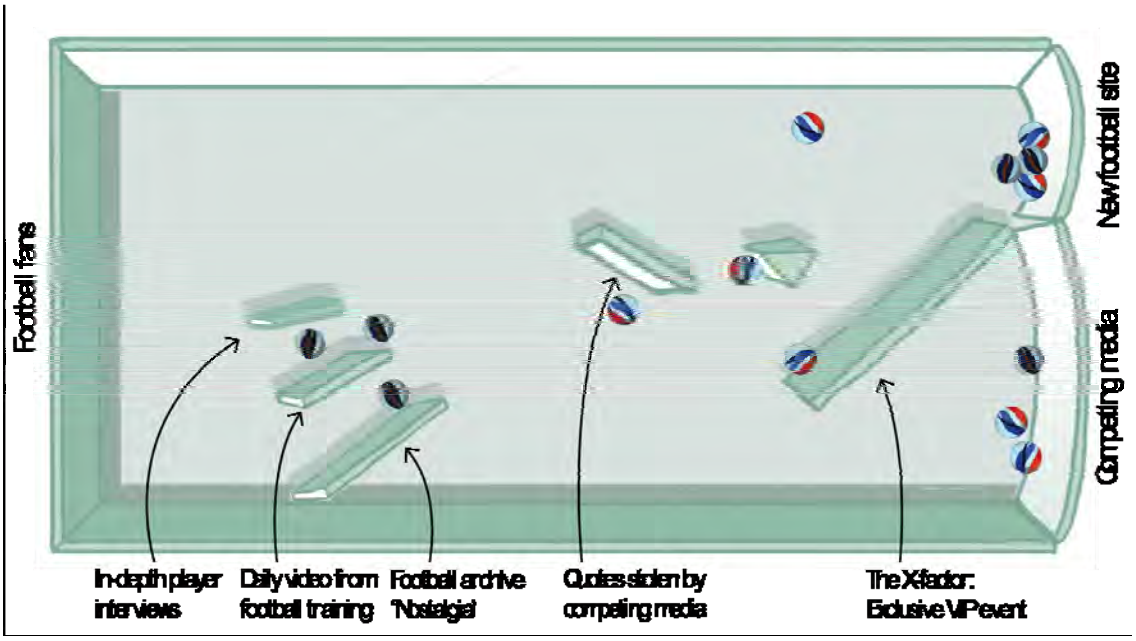

Figure 2 Pinball model of a new media site business, sloping left to right.

The amusement park team chose – not without discussion, as we shall see later – to label their two receptacles 'Usual purchase' and 'Higher purchase' (Figure 3). The customers (or guests as they like to call them – the balls) are directed by barriers of 'Wristband charging', 'Short waiting lines', 'Advance BBQ table booking' (so regular guests don't need to occupy a popular table from early morning), and a 'Mobile sales corp' of floating sales agents. All the obstacles guide the balls towards higher purchase, except for the wristband charger, which *'could go either way, because for some they will buy more, but for others it will help limit purchase'*, says a researcher in that team, who is also a year-pass holder with the amusement park. The park

model has an unlabelled barrier at the end of the slope, not unlike the X-factor of the media model, except it points the other way, so it is much more difficult to enter the 'higher purchase' section. It reflects the park manager's experience that *'this is actually quite difficult, because we have worked a lot with extra sale already'*.

The interactivity of the models follows a set pattern. Participants discuss, make changes to the layout of the field, assemble all the balls behind a ruler at the top end of the slope, and let them run. The behaviour of the balls trigger new conversations. In both models there are devices that act as 'randomisers' to ensure a spread in the way the balls run. This randomness seems to be an important part of the concept; trial runs with single balls don't provide much trigger for discussion.

Although participants regularly refer to how many balls end up in one or the other receptacle – media manager: *'Oops, this is going to be a tough season!'* – there is never an attempt to actually count the distribution. It's the basic notion that customers react that is important.

A BUSINESS MODEL REPRESENTATION

A first proposition is that the pinball games are objects designed to represent business models. By playing the game, participants are able to simulate how their business will develop. Let us investigate which properties of the more familiar business model descriptions they replicate by comparing with influential literature like Osterwalder and Pigneur's *business model canvas* (2009) and Chesbrough's functions of a business model (2007). The business model canvas features nine building blocks each representing a business model component.

In the pinball game the *customer segments* are represented by the variety of balls rolling down the field. Osterwalder & Pigneur suggest that customer groups represent separate segments if: (a) Their needs require and justify a distinct offer, (b) they are reached through different distribution channels, (c) they require different types of relationships, (d) they have substantially different profitabilities or (e) they are willing to pay for different aspects of the offer. Chesbrough likewise talks about 'target markets'. Prior to the pinball activity participants identified different customer segments and selected the ones they found most interesting. In the pinball models, the balls are all alike – no customer segmentation – but when running down the slope, they behave differently, some run here some run there in unpredictable ways, just like real customers.

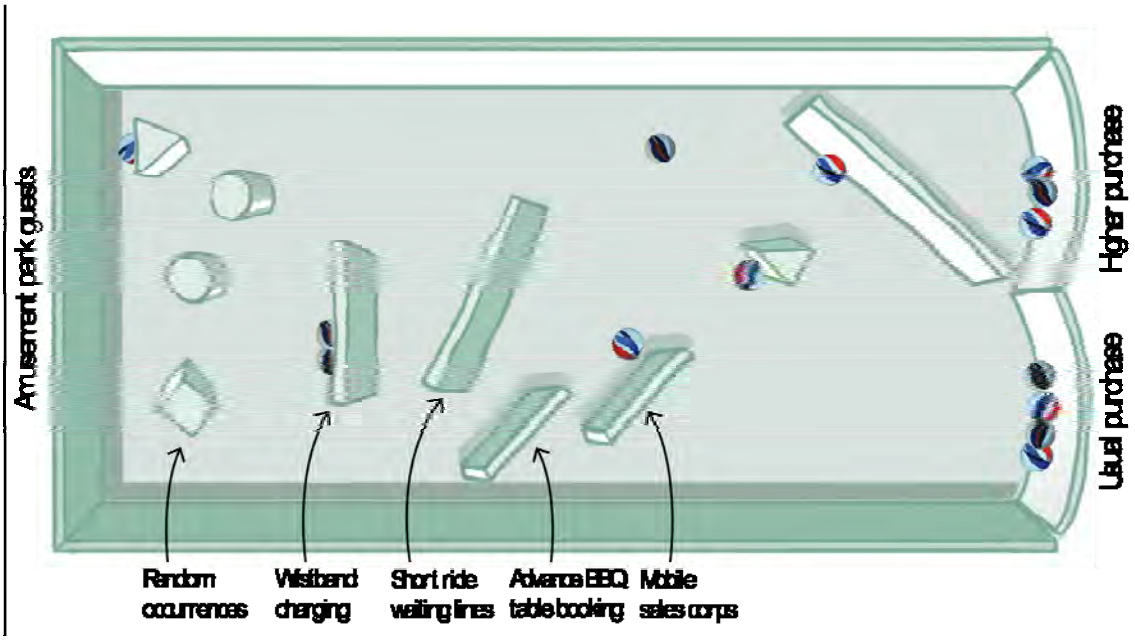

Figure 3 Pinball model of an amusement park business, sloping left to right.

The *value proposition* (i.e. the product or service offered) is modelled through the guides in the pinball playing fields: For instance access to a football archive and the football player interviews in case of the media site.

Distribution channels were shortly represented in the pinball session especially in the media house case where different ways of reaching customers were discussed while also conversation about a direct relationship between customers, journalist and soccer players occurred several times – for example live distribution from training or (video) chat with players represented as barriers in the pinball playing field. One can argue that maybe the perspective of distribution channels maybe also is an aspect that is not suitable so earlier in business model development (typically a marketing theme, but things are also radically changing in this area).

The *revenue stream* is modelled by equating the balls with income. This may be an over-simplification, but in the amusement park case the team does get to discuss dilemmas between payment from season card holders and from one-day visitors in relation to the business model of an 'all-inclusive' offer by the entrance. Osterwalder & Pigneur distinguish between 'fixed menu pricing' (predefined prices are based on static variables) and 'dynamic pricing' (prices change based on market conditions), where in this case only fixed menu pricing was discussed or there was simply no dialogue about other types of revenue streams.

A component not included in the business model canvas is the competitive analysis or competitive strategy as Chesbrough calls it. Osterwalder & Pigneurs argument would probably be that this is a representation of the company's own business model, not that of other's. Interestingly, the media house team chose to arrange the pinball game with an own income area and an area for competitors. The amusement park instead chose to in some way to compete with itself as the question here was how we get customers to spend a little extra when they are already in the park, not how to convince customer segments to choose the park in the first place.

In a single design process the pinball game was successful in encapsulating the results from prior activities and indeed challenging them. The value proposition (functionality and placement or structure of offerings), customer segments and revenue streams (fixed in these cases) were visible throughout the session, while Competitive strategy elements (the media house case) sometimes occurred. The pinball contraptions primarily model the customer side of the business, not the internal side – the resources that go into developing the supplier network, the cost structure, key resources and so on. Though if more time were given to the workshops one could speculate that the internal side also would be a part of the representation. For example key resources or key partners could be 'helpers' instead of obstacles or barriers.

A SCAFFOLD FOR PARTICIPATION

Another proposition is that the pinball games are objects designed to support collaboration between participants with very different experiences and competencies relating to business. The participants in the event included managers from the two companies, business practitioners from other companies, business consultants, and researchers and graduate students from both the business and design departments of the university. Many of the non-company participants were unfamiliar with such concrete discussions of business issues and are not familiar with the abstract business terminology. However, many of them can easily personify with users and customers: Some of them are football fans themselves, or count football fans to their family or circle of friends. Some have visited the amusement park with their family, one even is a year-pass holder, who visits the park regularly – and thus thinks of herself as a 'super user'.

In the terminology of Star (1989) one may regard a tangible business model as a *boundary object* that manages to engage non-business experts in discussing business. Boundary objects are 'both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites' (Star 1989:46). They support heterogeneous groups in collaborating, even if they do not share models of each other's practices or share goals. The pinball models refer to a commonly known metaphor of pinball games, wherein

balls roll down a slope, negotiating barriers. There are obvious differences to arcade game pinballs: There are many balls in play at every one time, and there is no incentive in preventing balls from reaching the receptacle(s). Even so, the intuitive understanding of the physics of balls rolling and bouncing off barriers is shared across all participants.

In another sense the pinball models also support collaboration across heterogeneous participants through their very tangibility. Brandt (2005) suggests the term *thing to think with* to denote objects that scaffold participants in expressing themselves with their hands. The pinball models help express hypotheses about what customers might do in concrete, physical ways: Simply letting the balls roll. The models share traits with presentation models, but it only really comes to life when participants themselves start experimenting with the balls, barriers, asking: 'What if…?'

Similarly the pinball models can be seen as props that help enhance the 'quality of innovative conversation' (Buur & Larsen 2010) among participants. The quality increases if crossing intentions are allowed to surface, if participants can easily relate to own experiences, if spontaneity allows participants to imagine new roles, if a continuous discussion and readjustment of goals is supported.

In the video recordings we find traits of both the perspectives on the design object: The activity proceeds *because* participants work hard to describe what the design materials represent in business terminology, and the immediate tangibility of the design material allows team members to participate in the discussion on equal footing.

EXPERIMENTING WITH MEANING

By establishing the analogy between pinball game and business, we challenge participants to compare meaning of physical actions with those of business moves. In this section we present excerpts of conversations from the team process of designing the pinball models. We describe how participants assign meaning to the design material by forming hypotheses about what the balls may do, experimenting with balls rolling down the slope, and reacting to unforseen ball patterns.

WHAT CUSTOMERS MIGHT DO

In one experiment in the amusement park group, many balls get stuck on the 'Short waiting lines' barrier placed, as it is, perpendicular to the slope direction. This triggers a discussion of which way it ought to be angled, and thus what effect ride waiting time may have on purchase. The seven participants are labelled with letters A-G, where A and B are the managers of the amusement park.

C: This one has to turn, doesn't it?

G: Can't we imagine that it should be angled this way *(towards 'Higher purchase')*, because if people are bored, then they buy more?

D: Yes, that's absolutely right.

C: It could point in both directions; we could split it in two parts *(picks up the barrier, intending to split it).*

D: No, wait – let's put it precisely here *(in the middle of the slope, angled slightly towards 'Higher purchase').*

C: But I find it a poor incentive structure, increasing waiting time to step up profit! *(…)*

D: No, no, try and see *(rolls a few balls individually).* We can either stay [in line] and spend some more money or go directly to the BBQ area. *(…)*

A: So it's the shorter waiting times that make them roll over in the right direction *('Higher purchase')*? It depends on how we adjust the angle? *(mimics adjusting the angle)*

B: Yes– if the waiting time gets long, then it's got to point this way *(changes the angle towards 'Usual purchase')*.

When observing that the flow of balls is stopped by the 'Short waiting lines' barrier, C realises that the barrier needs to move. G suggests tilting it towards 'Higher purchase', and earns immediate 'authoritative' support from D (the year-pass holder). C is not so sure, but D takes over and runs a few balls as an experiment to support her claim that balls still have two options ('either stay or go in the BBQ'). The balls actually all run towards 'Higher purchase', so A (the park manager) proposes a conclusion that it's the angle that decides the outcome. B (the park manager assistant), after pondering a while, suggests that in that case, an over-long waiting time would flip the barrier and guide balls in the 'Usual purchase' direction instead.

The participants are visibly forming a hypothesis about what shorter and longer waiting times might mean in relation to purchase; but at this point, it proves so difficult to get more than one or two balls at a time out of the plastic container that the discussion moves in a different direction. We never get the 'answer'.

With the media model, the 'X-factor' barrier similarly represents a shared hypothesis about what it takes to attract customers – 'that it needs something special'.

LETTING THE BALLS ROLL

The design material was consciously chosen for its 'dynamic quality' – the balls roll down the slope, bouncing off barriers, redirecting their flow as if they have a mind of their own. Thus it is interesting to observe how participants react to the rolling ball experiments. In the amusement park case, for instance:

F: There's a bit of a revenue highway over there!

B: They're the people who always spend more money, who earn a higher salary.

A: Or who use their pension funds!

Here, F introduces a business term to name the stream of balls he observes as a 'revenue highway', while B and A try to find a reasonable explanation based on their park experience – there are 'people who always spend more money'. The causality of the physical world is brought to bear on the business context – not as a 'true' simulation, but as hypotheses to be shared. The term *revenue highway* is elegant in its simple combination of business term and metaphor. It is an example of a vibrant, socially constructed concept that has the potential to the conversation in an innovative direction (Buur & Larsen 2010).

Although the building of the pinball models triggers a high-spirited conversation among the participants, the amusement park group shows some reluctance to actually try out what the balls will do. It takes 14 of the available 30 minutes before the team starts running balls down the slope – and then only because the facilitator makes the suggestion. Not so with the media group, it is more inclined to experiment. Within the 30 minutes this team runs five ball experiments. At the third time, the group has established that they need the X-factor barrier to help the balls run in the direction of the new media site, but the weight of the many balls is so strong hat they physically move the barrier:

R: Let us run the dream scenario *(lets go of the balls)*

L: Oh, I haven't thought about that it was not strong enough.

N: Bad press, no customers.

O: That just illustrates the market conditions.

L: Is that the dream scenario, half the market and randomness?

This experiment creates a discussion about the X-factor barrier, and how to make it stronger, opening up the field once again. Each ball experiment may be seen as a scenario being tested; the team moves back and forth between reflection and action. By the time the group members run the balls for the fourth time it seems they are running out of ideas on how to make the balls roll towards the media site:

P: They highjacked all the nostalgias *(points to the competitor site)*

S: What can you do about your archive so it becomes unique?

The discussion continuous and they roll the balls again two times quickly after each other, this time moving the major 'money' obstacle, but nothing helps. After the second quick roll:

M: Let's just remove the money obstacle *(the X-factor barrier gets a wider and wider angle)*

By removing the money obstacle the participants know that the realism is gone, so they quickly work towards a more realistic new scenario. It is a continuous negotiation of trying out, redefining the business model and opening up again jumping between a divergent and convergent mode of thinking or in the words of philosopher Peirce *abductive reasoning* (in Kolko 2010).

WHEN PHYSICS 'TALKS BACK'

In both events we saw examples of incidents that surprise the participants and demand explanation. In the media house some balls got stuck at the 'archives' barrier, for instance: *'I think it's the same ball sitting in the archives again! Ha, ha'* (Figure 4), and for the amusement park: *'Some of them can't quite figure out the technology of re-charging the wristband!'* One of the amusement park regulars expressed surprise that her ball made it through the narrow opening of 'Higher purchase': *'It's actually the reduced waiting time next season that will make me purchase more!'*

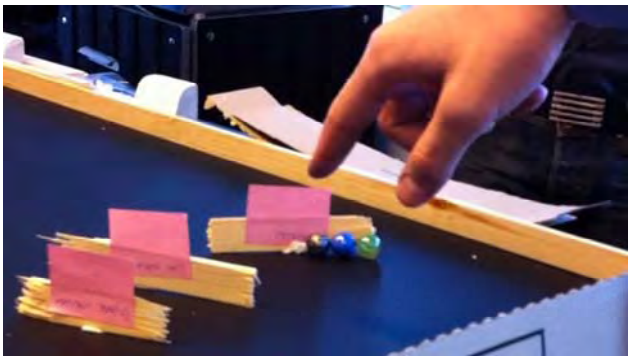

Figure 4 Surprise: Some of the balls get stuck – "I think its the same ball sitting in the Archives again! Ha, ha."

In each case, when something unexpected happens in the physical world of the pinball models, participants feel compelled to explain the event in business terms, and this triggers a discussion of the analogy. These surprises are very concrete examples of what Schön (1992), in an architectural context, would describe as 'backtalk': the designer creates a concrete expression of an idea, and the site or the 'material of the situation' supplies feedback that prompts a new appraisal of the context.

These moments of surprising backtalk, where things don't go according to plan, work as reminders that business isn't completely causal. If a company makes a move, customers and competition will react. These moments keep refreshing the discussion, as they bring in new questions and challenge the participants to generate meaning, continually shifting their focus back and forth between model and business situation.

CHOOSING PERSPECTIVE

As there are both representatives of the company and of potential customers around each table, it is possible to study how different perspectives come into play in the discussion of business models. Some participants develop emphathy with the customers (the balls) and this leads to unexpected turns of the conversations. We have observed some quite dramatic clashes of perspectives between company people and users when discussing what the pinball game actually represents, in particular in the amusement park team. Of the seven members in that team, two were company employees and the rest were a mix of innovation consultants and (business or design) researchers. Several of them had actually visited the amusement park with their family, so could easily personify with users.

'IF I WERE THIS BALL…'

There's no doubt about where the company representatives' 'we-sympathy' lies: *'If it rains, then we sell just as much, because we all these ponchos' – We* as in *our* company, sales force, *our* business. On the customer side, we see indications of empathy with 'the ball' in several dialogues throughout the 30-minute process. The tone of these may vary – from the neutral 'they' *('What about the ones that arrive by bus – what does their purchase situation look like?')* to the more committal 'you' *('All right, you're on a bus; then…')* – but at one point the discussion becomes emotionally charged as one participant identifies with the year-pass holders:

Figure 4 The balls are rolling. But is the focus on turn-over or customer satisfaction?

D: What I think is; I'd like to go to the amusement park with my family. At some point I make the decision to go, and then the ball is rolling.

D: So, if you sit here in the BBQ area, we've just arrived. If your children have this wristband, and it's full, then they go over there [by themselves]. But if they keep coming back to mum and dad to ask, 'Can I have some more money?', then it's a real pain!

From the way the other participants readily accepts her point of view, we can see that she speaks with the authority of one having actually experienced this situation.

ARE WE TALKING MONEY OR PEOPLE?

The basic concept of what the pinball game represents (What are the balls? What do the receptacles mean?) is repeatedly debated in the amusement park team between the participants with company and user perspectives. The park manager (A) is quick to suggest a concept within the first two minutes of the activity: *'Shall we include a status quo [receptacle] and one for the guests who buy more?'* Initially, the other team members accept this. The year-pass holder/researcher (D) picks up some materials and designates two receptacles: *'This is for money out of the pocket, and this is for money that returns back home with the customer'.* Everyone nods, although we now have different perceptions of what the balls symbolise: are they customers, or money? A picks up the question: *'Either it's the segments [of customers] or the payments that is decisive. That's the question'*. No clear decision is made at this point. Initially, it is not uncommon for teamwork to proceed readily despite some ambiguity around its purpose and goal. But eight minutes into the session, the conceptual question surfaces again:

D: But these [receptacles] are the pockets.

C: Don't we go by the segments?

B: If we go by the segments, then over here are the ones who spend little money, and they are, erm… for a large part identical to the year-pass holders.

The company representative B is clearly aware that D is a year-pass holder, so he tries to carefully phrase that year-pass holders are also the ones who spend 'too little' money in the park. Ten minutes later, C returns to the question:

C: But then we should go for a different concept: good user experience and poor user experience – what's a turn-on, and what's a turn-off. And then we want most of those with a good experience.

Here, the balls represent guests who may have a good or a poor user experience. The response comes a few minutes later from the park manager:

A: I've got another thing that makes more sense in my head (knocks the table with a long barrier across the 'High purchase' receptacle). This over here, that's what I said in the beginning, that's status quo. (…) Now we create some elements that will help increase the business for 2013. How do you get into this small pocket over here…?

In placing the long barrier, A makes it more challenging to design measures that guide balls towards 'Higher purchase'. To A, the balls represent what the guests pay. After a longer discussion about increasing sales and whether to include the wristband as part of a package deal, D challenges A directly across the table:

D: …but that's when we look at the turnover. If we look at the user satisfaction, the *it's-great-to-be-here-I'd-like-to-come-back* feeling, if that's what the receptacles said, then it [the wristband] would point towards *it's-great-to-be-here*.

B: Personally, I don't think so…'.

The assistant manager picks up the super-user's challenge. The issue at stake is whether to focus on immediate turnover increase, or on improving the user experience (to create satisfied guests who will visit again, thus raising the turnover in the long run) – in other words, whom to value most: the one-day tourist, or the year-pass holder? This struggle among different perspectives around the table is not simply an academic discussion; the participants who engage in it have something at stake on a personal level. In conversation-analysis studies of comparable activities (namely, staging of business relations in a value network), Wagner (2012) has pointed to a similar issue: that participants with real stakes in the activity (company representatives) and participants playing a role that is far removed from their real life (students) tend to behave differently, and that participants use laughter to gloss over the breaches in social order that inevitably crop up.

DISCUSSION

What came out of the pinball activities? Was it worth the effort? It is relatively easy to track what each team gained from their experiments with the pinball models. The media producer left the seminar with a clear understanding that an 'X-factor' is required to turn the idea of a football fan site into business. The amusement park managers were challenged on their idea that a wristband would guarantee immediate higher purchase; it became apparent that there is business to be made by catering more specifically to the needs of year-pass holders, even if they bring their own lunch.

We have shown how these insights are generated by participants who formulate hypotheses about causalities, run experiments with what-if scenarios, and play with the meaning of ball behaviours caused by the physics of the model. An important driver for this to happen is that participants around the model are able to personify with different important perspectives, and maybe even emphasise with the ball.

In the reflection session following the seminar, the company representatives agreed that this was a great way to start a discussion of business issues; indeed, the amusement park manager had already agreed with his colleague that this would be an activity worth including in the programme for their next employee seminar. Apart from the participants' own reflections that the day made sense to them, we cannot prove that the understandings and ideas generated in the sessions were indeed new and innovative.

We claim that the tangible business modelling activity has the potential to:

(1) Open up the process of innovating business models to participants beyond those marketing people, who understand the business lingo and usually devise business plans and strategies. We work from the conception that innovation happens in the meeting between actors with different professional expertise and stakes in the project, like development engineers, designers, business specialists, even users.

(2) Challenge participants to enrich an abstract, argumentative mode of discussing business with a concrete, experiential mode of developing new perspectives on the issues. Our basic assumption

is that this richness of playfully 'thinking with hands and body' enhances the 'quality of conversations' towards an innovative outcome.

CONTRIBUTIONS TO PRACTICE AND THEORY

This research helps expand user-centred design towards user-driven innovation. Innovation presupposes a genuine interest for the business side of new products and services. We envision that we will be able to develop sets of materials, like the pinball game construction kit, which business people may include in their practice both as a boundary object that allows one to include more perspectives and as a physical facilitator to break conventional patterns of interacting. This presupposes that practitioners will accept that innovative outcomes most likely originate in the clashes of different perspectives (rather than in mono-disciplinary deliberations) and are fostered in innovative processes (rather than conventional meeting discussions).

We suggest that our work also has theory implications for a broader understanding of the role that physical design materials can play in conversations – about business and more generally. It provides empirical data to start identifying which patterns of conversations may lead to rethinking of present business models and formulating of new business concepts.

On the methods-side we suspect this is but one of a family of methods that employ physical material to model business dynamics. Our experiments earned a very positive evaluation from the industrial partners, although to turn the methods into 'sticky' professional practices may still need both research and development work.

ACKNOWLEDGMENTS

We are grateful to the business representatives and researchers who joined the business modelling event in Aalborg in March 2012, willingly engaged in the experiments, and permitted video recording. We also thank Daniela Santos, Torben Jensen, and Robb Mitchell for developing the pinball business model idea while studying with the graduate course IT Product Design in Sønderborg.

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BRANDING MEETS DESIGN MANAGEMENT: BRANDS GRAPHIC SIGNATURE AND ITS CEREBRAL RESPONSES

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Through a research that coordinates design management and branding with neuroscience theory, the present paper answers how the consumer brain responds to the visual perception of brands graphic signature. Design management plays a central role in branding, communicating the brand deepest values through elements there are perceived by the human senses. One of them is the graphic signature. Understanding the responses generated by the visual perception of it is of great importance for both study areas. The emotional and rational brains are briefly explained, to differentiate the consumer reactive and analytical cerebral responses originated from the visual perception of a brand graphic signature, which, with high emotional appeal, triggers an automatic preconscious response that, if positive, can assume the form of preference, and even result in an impulsively buying decision.

Keywords: Design management; branding; neuroscience

INTRODUCTION

The consumer's brain, generally, answers the visual perceptions basically by two manners: the first response is fast and occurs in a short period of time, being called "reactive", "emotional" or "automatic"; the second is a little bit more slow and occurs in a longer period of time, being called "analytical" or "rational" (Goleman, 2009; Rodrigues, 2011; Mozota et al, 2011; Cayuela et al, 2011). "There seem to be apparently two mental systems leading to decision: one that allows more extensive forms of reflection, but it consumes more mental resources, and a more automatic, but more inaccurate" (LeDoux cited in Rodrigues, 2001, p. 84).

Knowing that, this paper aims to answer how the consumer brain responds to the visual perception of a brand graphic signature. To do so, are described the two above-mentioned mental systems from the point of view of branding, focusing on the responses that these mental systems produce facing the visual perception of the brand graphic signature. The aim of this study is not to develop a detailed investigation about the functioning of the human's nervous system, but specifically understand the cerebral responses generated from the visual perception.

Then, the objective of this paper is to differentiate the fast (reactive or emotional) and slow (analytical or rational) brain responses originated from the visual perception of the brand graphic signature. To achieve this, are configured the following specific objectives: 1- to expose the results of the literature search conducted about design management and related subjects in their relationship with branding; 2- to briefly describe how behave the analytical and reactive mental

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systems; 3- to conclude interpreting how each one produces its response to the visual perception of the brand graphic signature.

The technical procedures involve the literature research, for the construction of theoretical fundamentals that make possible the development of the paper. It includes subjects of design management, graphic design, visual identity, brands, branding and neuroscience. For the description of the emotional and rational mind, from the collection of bibliographic data, the comparative method is applied to differentiate the reactive and analytical brain responses generated from the visual perception of a brand graphic signature. Then, the collected data is interpreted in the light of the branding and design management literature.

BRANDS

Initially, the function of the marks was to name the products to identify them, but this concept has evolved over time, especially after the Industrial Revolution. “The market was being flooded with uniform mass-produced products, almost indistinguishable from each other”. Therefore, they needed marks that differentiate them not only in terms of origin, but also in terms of quality. “In the context of manufactured uniformity, the difference based on the image had to be made with the product” (Klein, 2007; p. 30). From the evolution of this idea, the marks have become brands.

Historically, a brand could be defined as “a name, a word, a sign, a symbol, a drawing or a combination of them, intending to identify the goods and services of one seller or group of sellers and differentiate them from competitors’ (Chertatony & Riley, 1997 cited in Batey, 2010, p. 26). But, in the last few years, the intangible values became more valuable than the tangible (Gobé, 2002, p. 18) and the “brands now carry deep currents of meaning in terms of context of use, socio-psychological nature of consumers and cultures to which they belong” (Batey, 2010, p. 15). Today, “a brand communicates with consumers at the level of senses and emotions, a brand stirs up for people, forging a deep and lasting connection” (Gobé, 2002, p. 19).

Currently, the brand is a factor of individual and cultural significance: what “is sold is not a product, but a vision, a ‘concept’, a lifestyle associated with the brand, which allows individuals to express their own individuality and worldviews. “Name, logo, design, slogan, sponsorship, store, everything must be mobilized, redefined with a new look, in order to refresh the image profile, to give a soul or a style to the brand” (Lipovetsky, 2007, p. 40). “All these contents are reduced to overlapping signs, culminating in the super-sign that is the brand: the only and true message”.

In this context, the brand “focuses on the strongest aspect of the human character, the desire to transcend the material satisfaction and experience the emotional fulfillment” (Gobé, 2002, p. 19), encouraging the creation of emotional meaning associated to the brand, by the consumer. “Although the nature of these meanings evolves over time, a brand will continue to be a group of meanings. In fact, these meanings must be constantly renewed, modified, polished, and, when necessary, replaced” (Batey, 2010, p. 31). This is the role of brand management – also called branding.

BRANDING

According to Kotler (cited in Tybout & Calkins, 2006), “branding is much more than naming an offer. It means making a promise to customers on how to live an experience in a whole new level. It means ‘to live the brand’”. Create brands refers to the emotional connection with people in everyday life. Only when a product or service causes an emotional dialogue with the consumer that can be called brand (Desgrippes cited in Gobé, 2002, p. 17).

Brand management, or branding, is the ‘corporate philosophy’ which endows the offers with meanings: associations, attributes and benefits that allow the creation of emotional bonds between product and consumer. “Defining the meaning of a brand consists of a differentiation strategy in a market with too much information. In this context, the emotional factor is indispensable for the

creation of meaning and knowledge in branding, which, in turn, is originated from the theories of management (marketing), communication (advertising) and shape (design)"(Gomez et al, 2011).

"Branding has always been the creation of emotional ties between the brand and the consumer. Like in any relationship, the emotions are based on the information captured by our senses" (Lindstrom, 2007, p. 112). Therefore, it is necessary to create and manage the elements of brand design, which will transmit the brand values to the human senses, specially the vision. That's the role of design management.

DESIGN MANAGEMENT

Design "always involves both an intention, a plan or a goal, particularly in analytical and creative phases, and a draw, model or sketch, at the implementation stage, to shape an idea" (Mozota *et al*, 2011, p. 16). Design plays a key role in shaping the world and generate new products, systems and services in response to numerous market conditions and opportunities, working as a "mediator between the industrial and technological world and the consumer" (Mozota *et al*, 2011, p. 17).

Design also "supports the link between brand and strategy: 1- design and branding: design is a link in the chain of a brand or a way of expressing brand values to its different audiences; 2- design and corporate strategy: design is a tool to make visible a strategy" (Mozota *et al*, 2011, p. 17). In branding, design is "a discipline to solve problems related to the business and not just to create aesthetic appeal" (Phillips, 2008, p. 52). This highlights the strategic role of design, which "only becomes effective when you can solve the proposed problem. Therefore, it is necessary that the problem be clearly described. Moreover, the solution presented must be consistent with the business objectives" (Phillips, 2008, p. 40). If we wish design to be considered a strategic issue within the company, we need to act strategically, in coordination with the other functions of the organization. This naturally influences the design solutions, as they are part of the strategy" (Phillips, 2008, p. 24, 36).

The design with focus on strategy can be called "design management". Gorb (1990 cited in Minuzzi, Pereira & Merino, 2003) defines it as the "coordination of the design resources available in an organization to meet its objectives" or as an "effective distribution by managers of the design resources available to the company achieve its goals" (1990 cited in Best, 2006, p. 12; Mozota *et al*, 2001, p. 92). Thus, "the important aspects of design management involve understanding the strategic objectives of an organization and how design can play a role, and effectively implement the ways and means, the tools and methods, teams and planning requirements, as well as passion and enthusiasm to achieve these goals as a result of success (Best, 2006, p. 12).

According to Tim Bachman (cited in Phillips, 2008, p. 114), "design management articulates implicit and explicit communications that reflect the company's values", thus, "it adds tangible and intangible values to the company": it adds a brand. "Design management contributes to define the profiles of consumers and the values to be added to products and services in order to increase the company's business" (Fricke cited in Phillips, 2008, p. 115). It "helps the designer creating the differences that are perceived by consumers as benefits and that impact on their behavior" (Mozota *et al*, 2001, p. 110) by transforming the company meaning and image in a powerful tool to communicate, motivate and inspire (Larsen cited in Phillips, 2008, p. 117). To achieve this, "the establishment of the brand is the most used process. The differentiation and the brand management are part of design management (Mozota *et al*, 2011, p. 110). In accordance with Best (2006: 16), "within an organization, design management is present in the brand communication".

Mozota (2011, p. 125) explains that "the launch of a brand is one of the most effective ways to spread design across an enterprise. If the brand is well-developed and persuasive, promotes loyalty and encourage feedback from consumers", by transmitting the brand benefits, attributes and values, and reinforcing its meaning across all touch points experienced by the consumer. Design penetrates all components of brand value, mission, promise, positioning, expression and quality: "there is graphic design in the name and symbol of the brand; product design in the product

performance; packaging design at the point of promotion; and environmental design in the store environment". All non-verbal elements of a brand – appearance, colour, touch, smell, finishing and sound – can be projected by design (Mozota *et al*, 2001, p. 127).

Design "participates in the brand valorisation making it alive in different bases: packaging, product, advertising, and in the long run, different markets. Brand features include credibility, legitimacy and affection" (Mozota *et al*, 2001, p. 135). In the relationship between branding and design management, "that means consistency in aesthetic and form, continued use of graphic codes and symbolic creation of new emotions" and meanings. Graphic design works in transmitting these emotions and concepts through the visual elements that communicate the brand, regarding the form and the codes that compose the visual identity of the brand.

GRAPHIC DESIGN

Design plays a central role in branding, because it works on the creation of brand elements, and must "make many critical decisions regarding the use of names, colors, symbols and the like. This helps consumers to perceive a product consistently with the brand intentions" and meanings (Tybout & Calkins, 2010, p. 27). In this sense, "the more consumers 'experience' the brand by seeing, hear or think of it, the greater will be the probability of getting it registered strongly in their memory" (Keller & Machado, 2006, p. 43). "So, anything that causes consumers to view a name, a symbol, a logo, a character, a package or a brand slogan can potentially increase the familiarity and the remembrance of that brand" (Keller & Machado, 2006, p. 43).

The brand design is a step between the articulation of its concept and the creation of other contacts with consumers. Ideally, it should employ a wide variety of tracks or brand elements (Tybout & Calkins, 2010, p. 32). And "since the brain receives and processes images more easily than words, visual devices and symbols are important tools for building a brand and have proven to be easier to remember than words" (Batey, 2010, p. 253). These visual elements are created through the visual programming or graphic design, "a set of theories and techniques that allows us to order the way we make visual communication" (Strunck, 2007, p. 53).

Graphic design refers to "the process of programming, projecting, coordinating, selecting and organizing a number of factors and elements to create objects intended to produce visual communication" (Frascara, 2000, p. 19). Graphic design considers everything that comes to visually symbolize the brand as way of communicating intangible values and convey symbolic meanings. To visually communicate the brand values and personality the designer creates a visual identity.

VISUAL IDENTITY

The visual identity is the translation of the personality, attributes and benefits of a brand in shapes and colours. According to Strunck (2007, p. 57), "the visual identity is the set of graphic elements that communicates the visual personality of a brand". In this way, it is great the importance of the visual identity in branding, as a way to communicate the meaning of the brand.

According to Strunck (2007, p. 69), to communicate the visual identity of brands, there are basically four elements: "the main: logo and symbol, and the secondary: standard colour (or colours) and standard alphabet" (Strunck, 2007: 80; Peon, 2011: 28-32). One of the most important element that compose the brand visual identity (and usually serves as a starting point for the creation of other elements) is the graphic signature, formed by the combination of the main elements: the logo and the symbol. The graphic signature communicates the brand meaning and its values in order to identify the company and create an emotional appeal to consumers. In this sense, graphic signatures "have meanings and associations that change the consumer perception about the company" (Keller & Machado, 2006, p. 105).

The importance of the graphic signature is justified because the other elements of the visual identity derive from it, and because it has the ability to visually convey the brand values. So, it

becomes vital for branding to understand how the consumer responds to it. Any visual identity, and graphic signature, specifically, can be positioned in an arrow of two axis: graphical expression and emotional meaning" (Gobé, 2011 cited in Mozota *et al*, 2011, p. 128). To understand how these two axes generate responses by the human brain, it is necessary to understand the two mental systems that answer the visual perception of the brand graphic signature. One is responsible to analyze the graphic expression of it, considering all elements of colour and shape and making relationships with other knowledge; and the other to react emotionally to the meaning transmitted. This response is rapid and occurs in a really short period of time, being called reactive or emotional, while the first is a bit slower, being called analytical or rational (Rodrigues, 2011, p. 84).

CEREBRAL RESPONSES

The vision, more than any other sense, provides information about the world (Wheeler, 2009, p. 52). According to Aamodt & Wang (2009, p. 64), "the vision begins in the eye, which works in the same way of a camera. A lens in the front of the eye focuses the light to a thin layer of neurons on the back, called retina". "The light energy reaches the eye through the cornea, enters through one opening, the pupil (an open area in the center of the iris), crosses the vitreous humor and reaches a light sensitive area, called retina (Rodrigues, 2011, p. 65).

The retina receives in the first instance visual information, then undergoes a process of photo transduction, a kind of encryption, because the retinal neurons are arranged as a sheet of pixels, each one detects the light intensity of a given region of the visual world. The light moves linearly: the light that hits the head of the person in front of me, will reach the basal part of my eye, and the feet the top, so the image appears inverted (Rodrigues, 2011, p. 64). The retina turns the world upside down, but it does not affect our vision because the brain is aware of this fact and interpret the information correctly (Aamodt & Wang, 2009, p. 64).

The retina contains visual receptors: cones and rods (Rodrigues, 2011, p. 65). In accordance with Aamod and Wang (2009, p. 64), "there are three different types of the so-called cone cells of retina, each one detects the green, red and blue colors. These neurons send signals increasingly stronger as the light intensity detected becomes stronger. According to the authors, "the other colors are formed by different levels of activity in the combination of these three cell types". A fourth type of cell called rod detects the intensity of light in the darkness, but does not contribute to color vision (Aamodt & Wang, 2009, p. 65). In the words of Rodrigues (2011, p. 65), "these visual receptors convert light into nerve impulse that are carried by the axons. These axons together form a beam of nerve fibers – the optic nerve".

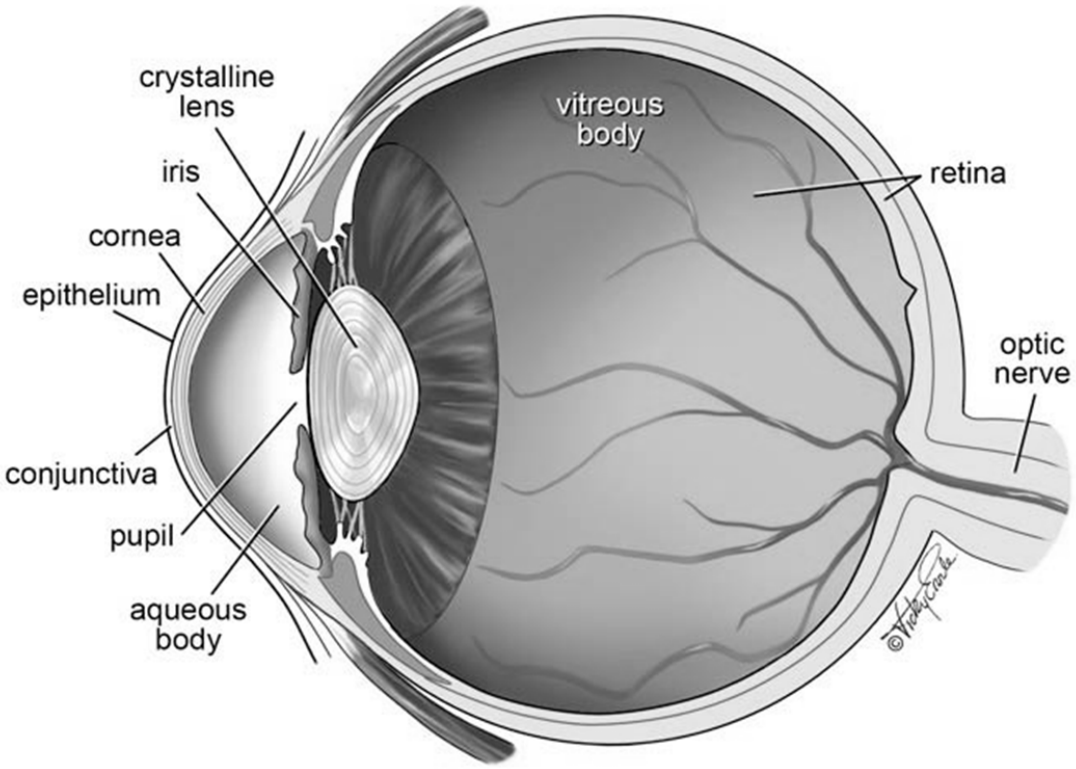

Figure 1 The vision [http://www.boydvision.ca/library/about-your-eyes.html accessed on 07/05/2012]

The optic nerve of each eye projects the nerve impulses to the brain. The optic nerves follow a pre-defined circuit in the brain: after the optic chiasm, the optic fibers are mostly projected for the dorsolateral geniculate nucleus of the thalamus, most part following to the cerebral cortex (primary and secondary visual cortex), which is located in the occipital lobes in the rear area of the brain. One other part goes directly to the amygdala [see Figure 2] (Rodrigues, 2011, p. 65). While the cerebral cortex must first determine the brightness of each part of the object that produced the visual image, calculate the depth in a scene and decide what objects are in it (rational analysis), the brain also has special forms to recognize objects that have particular importance (emotional reaction), such as people faces or the graphic signature of our favorite brand (Aamodt & Wang, 2009, p. 65-66).

According to Mozota (2011, p. 112), the consumer response to a visual perception “is determined by two distinct styles of information processing: the cognitive and the preferential”, which can also be called analytical and emotional. The images “imply a cognitive treatment of them (a process of thought) and/or a treatment of emotional information (a process of feeling). Therefore, “the processing of information or is logical, rational, sequential, or is holistic and synthetic”.

Rodrigues (2011, p. 84) also explains that “when we make decisions we can make it through a long process of deliberation on various options, considering the pros and cons before choosing the most logical solution. In this case, the decision-making seems to be a rational decision, an intentional process based on the language. However, many times, decision-making can be a different phenomenon, very intuitive, which involves simply choosing the option that we ‘feel’ is more correct. In the latter case, the decision appears to be based on something quite different from reflection, more visceral, more emotional, which arises spontaneously in the form of preference”.

So, there are two mental systems that lead to a response to the visual perception, or to a decision based on it: one that allows more extensive forms of reflection, but however consumes more mental resources, and a more automatic, but more inaccurate. “Besides being anatomically distinct mental systems, the different processing speed is the feature that most distinguishes them”

(LeDoux, 2000; Lieberman, 2007 cited in Rodrigues, 2011, p. 84).

> *These two fundamentally different ways of knowing interact to construct our mental life. One, the rational mind, is the way of understanding that we typically have consciousness: most prominent in the field of attention, thoughtful, able to ponder and reflect. But beside this there is another knowledge system: impulsive and powerful, although sometimes illogical – the emotional mind. […] These two minds, emotional and rational, most often work in perfect harmony, combining their two different ways of knowing to guide us through the world. Typically, there is a balance between the rational and emotional minds, in which emotion is fed while informs the operations of the rational mind, and this refines and sometimes prohibits the contributions of emotion. However, the emotional and rational minds powers are semi-independent, reflecting, each one of them, the operation of distinct, but interconnected, circuits within the brain.*
> (Goleman, 2009, p. 31)

In human brains, this emotional mind is related to the amygdala (from the greek word for 'nuts'), which is a group of structures in the form of an almond perched on the top of the brainstem, near the lower edge of the limbic ring. There are two amigdalas, one on each side of the head. Joseph LeDoux, neuroscientist at the Center for Neural Science at the University of New York, explained through his research "how amigdala can take control of what we do while the thinking brain, the neocortex, is still trying to reach a decision" (Goleman, 2009, p. 36-37).

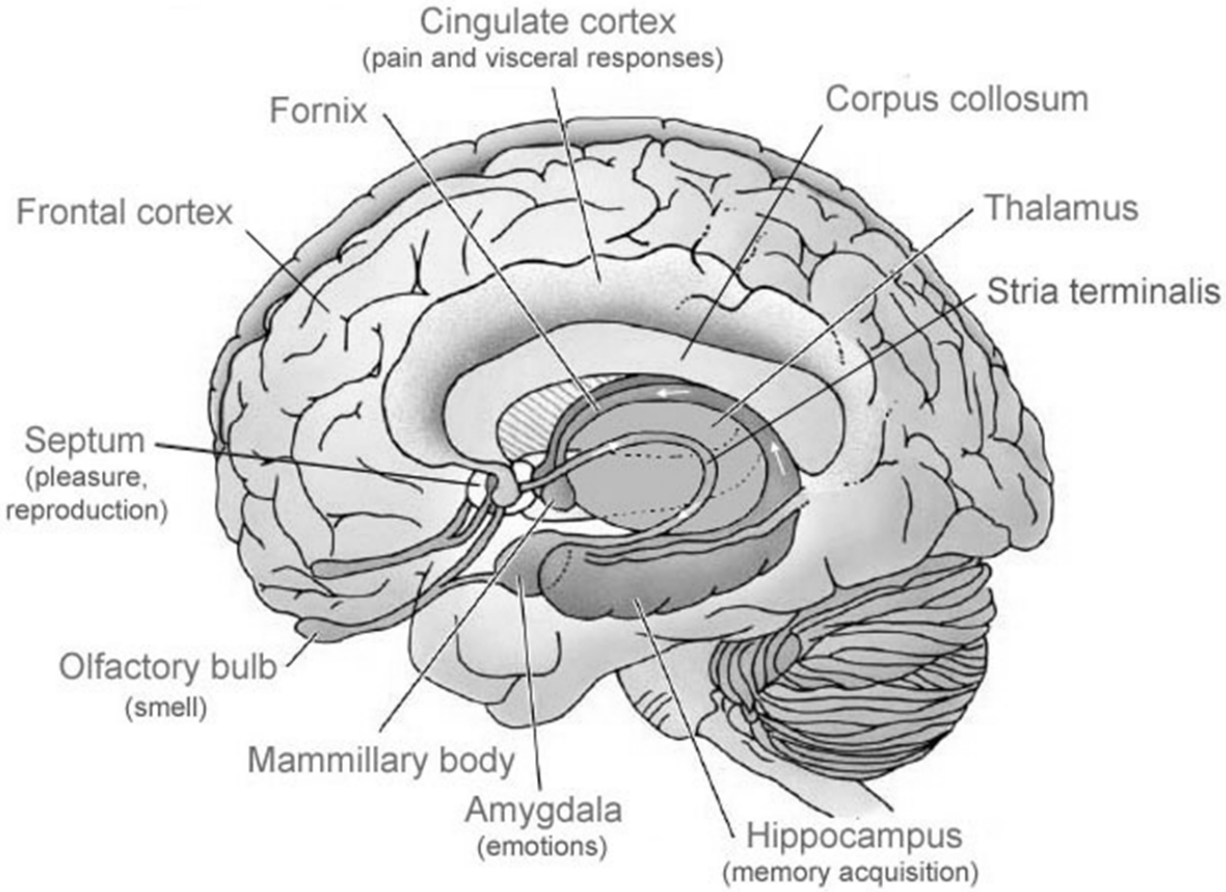

Figure 2 Some Important Cerebral Structures [http://www.quora.com/Philosophy/Is-there-such-a-thing-as-the-subconscious accessed on 07/05/2012]

The investigations of LeDoux (*apud* Goleman, 2009, p. 39) demonstrated that the sensory systems from the eyes and ears reach the brain passing first through the thalamus and then – through a simple synapse – through the amygdala; a second signal from the thalamus is sent to

the neocortex, the thinking brain. “This branching allows the amygdala to begin to respond before the neocortex, which analyzes the information, making it pass through several levels of brain circuits, before understanding it completely and then formulating its own answer”.

> *A visual system flows first from the retina to thalamus, where it is translated into the brain language. Most of the message then goes to the visual cortex, where it is analyzed and evaluated in terms of meaning and appropriate response; if that response is emotional, a signal goes to the amygdala, which triggers the emotional centres. But a small part of the signal goes directly from the thalamus to the amygdala in a quicker transmission, allowing a faster response (although less accurate). Thereby, the amygdala can trigger an emotional response before the cortical centres have had time to fully understand what is happening. (Goleman, 2009, p. 40)*

This direct route has a huge advantage in terms of brain time, which is counted in milliseconds. The amygdala of a rat is able to begin responding to a perception in only twelve milliseconds. The route thalamus-neocortex-amygdala takes approximately twice as long. According to Goleman (2009, p. 45) “equivalent measurements in regards to the human brain have still not been made, but it is believed that the relation will probably be the same”.

According to the author, the route of emergency from eyes or ears to thalamus and amygdala is crucial: saves time in an emergency. And also offers an extremely fast way of linking the emotions, resulting in feeling before thinking. “No wonder we understand so little about our more violent emotions […]: these emotions are triggered independently, and before, thought” (Goleman, 2009, p. 45). This demonstrates that visual stimuli are capable of activating a surprisingly large number of brain regions without coming into conscious awareness (Aamodt and Wang, 2009, p. 227).

Although the amygdala is known for its role in fear responses, it also quickly reacts to positive emotional stimuli, such as the graphic signature of a brand we appreciate. “Altogether, the amygdala seems to be important to concentrate on events with emotional significance in the world around us”. The neurons in amygdala respond to vision, hearing, or touch, and sometimes, these three senses at once. “Many of these neurons have preference for certain objects, especially gratifying objects”, like a product stamped with the graphic signature of our favourite brand (Aamodt and Wang, 2009, p. 138).

When we see a product, “we realize not only what it is in the first milliseconds, but also decide whether we like it or not. The ‘cognitive unconscious’ presents to our awareness not only the identity of what we see, but also an opinion about it”. In other words, our emotions have a mind of their own, able to provide ‘views’ independently of our rational mind, creating a state of mind and maybe influencing it to make a decision (Goleman, 2009, p. 41).

However, “while the amigdala works triggering an anxiety and impulsive reaction, the area of the neocortical brain gives a more analytical and appropriate response to our emotional impulses. The neocortical response is slower than the emergency mechanism because it involves more circuits”. Normally, the prefrontal areas regulate our emotional reactions from the beginning. “The highest projection of sensory information that leaves the thalamus doesn’t go to amygdala, but to the neocortex, and its many centres responsible for recording and deciphering what is being perceived”, like the graphic expression (colours and shapes) of a graphic signature that produces a rational understanding. This information, and our response, is coordinated by the prefrontal lobes, the centre of planned and organized actions in view of a goal” (Goleman, 2009, p. 46-47).

“Thus, in a certain sense, we have two brains, two minds, and two different types of intelligence: rational and emotional” (Goleman, 2009, p. 50), that Rodrigues (2011, p. 84) called automatic and deliberative: “the automatic system produces fast reactions, but inaccurate assessments for the decision; while the deliberative system produces thinner decisions, but with higher cost of time and mental energy. The final product of this automatic system will be the

emotional response, involuntary and adaptive (Ledoux, 1994; Damásio, 1994 cited in Rodrigues, 2011, p. 84).

Then, we may prefer/choose a brand, i.e. decide, on a non-conscious way (not rational). All these studies suggest the existence of an emotional/affective automatic and preconscious processing (Rodrigues, 2011, p. 90). Although the meaning of the expression 'automatic' is up for debate, most of researchers use this term to indicate the processing that occurs below the threshold of consciousness (Ledoux, 2000 cited in Rodrigues, 2011, p. 88).

This information is valuable to branding. "The decision between buying or not is primarily a physical-chemical, biological process that occurs inside the brain, and not outside" (Camargo, 2010, p. 164). This means that most brands should have a graphic signature with strong emotional appeal that may trigger an emotional preconscious decision, which can reflect in preference, and even in a buying decision. Of course it is necessary to be attentive to the graphic expression of the graphic signature, its colours and shape, to generate the right interpretation of its design: the right understand of the brand concept. But it is also important to be aesthetically pleasant to the consumer, and generate an emotional positive response, which, even though unconscious, acts under the threshold of consciousness, as a state of mind, influencing our decisions (Goleman, 2009). According to Goleman (2009), a feeling that overflows our mind in a moment, continuous to act in our subconscious per hours.

CONCLUSION

Graphic design has always been concerned about the functional values of communication, since its goal is to solve a problem through the communication of information. However, as regards the design management in branding, only to communicate information and promote understanding is not sufficient. It is also necessary to transmit an emotional appeal, so the brand, rather than permit the identification of its name, can build an emotional relationship with consumers, which, if positive, may assume the form of preference, even influencing the buying decision. In the long term, it may even conquer the consumer's loyalty.

Knowing that the human brain responds to the visual perceptions in two different ways: the first one is fast, emotional and automatic, generated by the amigdala, and can be called reactive, automatic or emotional; the second is slower, conscious and rational, generated by the neocortex and can be called analytical or rational (Goleman, 2009; Rodrigues, 2011; Mozota et al, 2011; Cayuela et al, 2011), at the time of the design and evaluation of a graphic signature, one must take into account these two mental systems that will result in different types of response from consumers.

While the second produces a slow response, considering the analyzable aspects of the graphic signature and achieving a logical understanding of what it means and represent (the brand, the company that produced the product, and so); the first one produces a much faster response, based only on emotion, which, if positive, takes the form of preference and is transformed in a state of mind (Goleman, 2009) that may influence, unconsciously, the analytical response, may resulting in an impulsive decision-making.

Even if the decision comes from a rational analysis – for example: "the products of the brand this graphic signature represents have good quality and price" – a preference by the amygdala originated earlier, below the level of consciousness - for example "I don't know why, but I really like this product" -, influences the satisfaction with the decision made. In branding, it means that graphic signatures that stimulate a positive emotional response by the amygdala, are more likely to be positively evaluated, even when the rational aspects are not positive – "it is too expensive, but I deserve it".

Future studies can build tools to diagnose the emotional and analytical appeal of a brand graphic signature, to find out whether the consumers evaluate it positively by the

reactive/emotional mental system, showing the graphic signature for evaluation for a short period of time (less than half a second, so it can't be analyzed rationally); and by the analytical/rational system, exposing the graphic signature for a longer period of time (more than one second) for assessment. So it could be possible to note if the brand graphic signature in question will have a positive evaluation when detected quickly and-or slowly by the visual system of consumers.

The creation of a tool is already being developed, and is necessary since, although the analytical and rational assessment produce a conscious response, the emotional assessment originated by amygdala is automatic and unconscious, cannot being informed by the consumers, since they do not have awareness of this response (Rodrigues, 2011, p. 88; Aamodt & Wang, 2009, p. 227).

FINAL CONSIDERATIONS

Neuroscience has been providing numerous contributions to the brand management, with regard to improving the knowledge about the nervous system and its implications in the desires, emotions and decisions of consumers. The comprehension of the rational and emotional minds and their implications in choosing a brand or a product based on the visual perception of the graphic signature stamped on it, is of great importance for design management, responsible for managing the visual elements of a brand, as well as for branding.

This paper is intended to expose the knowledge obtained from neuroscience about the human rational and emotional minds, and alert designers and brand managers that one must be attentive to the consumer emotional response, as well as the analytical, at the time of evaluation of a graphic signature or other brand visual element. It is important to underline that the emotional reaction, for being unconscious, cannot be told by consumers through questionnaires, interviews and focus-groups. Thus, seeking for new methods to evaluate visual identities is an urgent task. Furthermore, this paper recommends the designer to always be in dialogue with other areas of knowledge, because many of them have important contributions to make to his work, such as the case of neuroscience.

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DESIGN MANAGEMENT AS LEADING RESOURCE TO ASSIST ENTREPRENEURS IN THE DEVELOPMENT OF TECHNOLOGICAL INNOVATIONS: CASE EVIDENCE FROM SMALL MEXICAN TECHNOLOGY BASED ENTERPRISES ESTABLISHED IN NEW TECHNOLOGICAL INDUSTRIES

Beatriz Itzel CRUZ MEGCHUN*

Scant empirical research undertaken on design management in developing countries increase the misconception of its use, role and values. Considering that socio-cultural conditions and values, business context and design expertise influence it. Thus, it is essential to produce research within the practice context and test it in there. This paper advances on the use of design management in the grounds of entrepreneurship within small Mexican TBEs in new technological industries. It used intervention experiments in three longitudinal case studies to analyze design management during the development of technological innovations. Findings exhibit positive effects of design management in assisting entrepreneurs to become aware about their condition; to make-decisions in risky and uncertain environments; to deploy tangible and intangible resources; to trigger innovative thinking and transform knowledge; and to assimilate information and manage cycles of innovation.

Keywords: Design management; technological innovations; technology-based enterprises

LITERATURE REVIEW

Businesses are immersed in complex hypercompetitive environments that demand continual innovative technological developments in products, services or processes and organizations (Organization for Economic Co-operation & Development, 2005). It is expected that their outcomes not only provide technological innovations and contemporary icons, but also statements that convey an attitude toward society. To meet these demands, firms have to evolve their capabilities to integrate, build, and reconfigure internal and external competencies (Deeds, DeCarolis, & Coombs, 1999). Herein, they have to be able to recognize their learning process and condition. This is not an easy task for CEOs, even worse for entrepreneurs/innovators. This research poses design management as possible resource to assist entrepreneurs/innovators' to develop their technological innovations. Due to it is a feasible domain that might sustain innovation through shaping strategies; triggering knowledge; and retaining knowledge from activities. Consequently, it explores design management (along other specializations) integration in three longitudinal case studies.

NEW TECHNOLOGICAL INDUSTRIES:

Innovation is not only a factor that leads to economic growth and well being, but it is also a vehicle to address socio economic problems in developing nations (OECD, 2012). Governments regard innovation as critical agency to tackle social and financial resources that restrain growth. They invest in industries, especially on new technological industries, that exploit innovation because

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internalizing and producing it stimulate complementary assets and innovation chains. This last assists on establishing relations between technological areas to diffuse new knowledge into a productive branch (Corona, 1997). Businessmen consider it as a profitable investment due to it is possible to produce outcomes with high add value. Organizations based on new technological industries rely on intensive use of technology to produce cutting-edge outcomes that are new to the market or new to the world (Sarason & Tegarden, 2001; Tidd, Bessant, & Pavitt, 2005; Beven, 2007). Industries with high level of intensive technology usage and implementation are: computer science, electronics, biotechnology, telecommunications, spatial technology, new materials and new technologies for energy and ecology.

TECHNOLOGY BASED ENTERPRISES:

Over the last four decades, researchers have emphasized the crucial role of technology-based enterprises (TBEs) in ensuring future prosperity for industrial nations (Little, 1977; Bollinger, Hope, & Utterback, 1983; Oakey, Rothwell, & Cooper, 1988; Office of Technology Assessment, 1992; Shearman & Burrel, 1989; Duening, Hisrich, & Lechter, 2010). These businesses represent a vital factor for any country interested in boosting its regional economy, promoting its technological transference, and securing its social stability (Merino & Villar, 2007; Contreras, 2008; Fernández-Dobaldo, 2008). TBEs are positioned at the hub where knowledge joins technological skills and expertise to conceive technological products and processes innovations for the market to benefit society (Storey & Tether, 1998).

TBEs are defined using qualitative and quantitative characteristics that vary depending on the geographical context. In Latin American, TBEs' have more generic and broad delimitations in the aspects that define them (Camacho, 1998). TBEs conduct processes where technology is new, generate their own technology, and offer products/services with high add value (Perez & Marquez, 2006). In Mexico, they further require to design, develop and produce new products/services or processes. Hence, they need to invest resources into research and development, favor innovation through organizational and managerial structures, and hire technological experts in highly specialized fields (Corona, 1997, p. 32). But above all, they are compelled to use creatively new means to manage efficiently their resources to deal with outmoded technology, machinery, processes and practices (Olalde, 2001). Under this context, TBEs are those organizations with highly qualified personnel that produce radical or incremental new products, services or processes for the market using scientific and technological knowledge.

INNOVATION:

Innovation is a key driver and a multidimensional approach in favoring the utilization of knowledge, technological skills and expertise to undertake processes that create new products/services. For the study, two approaches are explored, process and outcome. According to Oslo Manual (2005, p. 10), 'process innovation covers the implementation or adoption of new or significant improvements on the production or delivery methods in the organization's procedures; meanwhile, product innovation includes the implementation or commercialization of a product or service with improved performance or characteristics'.

Technological process innovations go beyond implementations or adaptations of methods, techniques, devices, machineries, and systems that increase the capacity of production of a company (Damanpour, 1987; Romo & Hill, 2006). They are also cultural and organizational shifts that affect basic work activities and its management, as it produces changes in the organization's structure and administrative process (Kimberly & Evanisko, 1981). They are also cognitive dynamic processes that require inputs to embody, combine or synthesis knowledge in an original, relevant and valuable way to make something better. Thus, technological process innovation refers to any change, technological, managerial, cultural or cognitive, that affects employees' behaviors, procedures and results in producing new outcomes for their organizations. Technological product innovation is considered a before-after process in the improvement of functional characteristic in new products/services. According to Schumpeter (as cited in Corona, 1997, p. 11), innovation is

'the moment in which a new product, process or service is introduced in a specific market to impact the production and market of goods. It requires of previous activities such as technological changes, inventions and technological developments, which are elements or factors of innovations'. Similarly, Zaltman et al., (as cited in Verhees & Meulemberg, 2004, p.136) consider innovation as 'the processes involved in developing a new item, the item in itself, and the process of adopting the new item'. Hence, technological product innovation is the process of developing, producing and commercializing outcomes into a market of goods that might influence users experiences.

Innovation depends on complementary assets such as technological acquisitions, financial and physical resources, organizational structures, and human capital (knowledge, skills, and attitudes). Entrepreneurs have to centre innovation around building-up capacities to learn new knowledge and capabilities that assist them on developing technological innovations. Learning (capacities) can be prompted and guided allowing enterprise to encourage innovation (Jerez-Gomez et al., 2005).

DESIGN:

Design is a multi-dimensional approach integrated for a family of disciplines that has foundations on science and art. Designers share skills and expertise that combine the logical character of the scientific approach and the intuitive and artistic dimension of the creative effort (Borja de Mozota, 2003). It has not an agreed definition, as it mostly experiences ad hoc definitions that are determinate by their specialization (Tether, 2005). Nevertheless, studies converge on describing design as a process that either solve problems or generate idea and as an outcome of this process (Gorb, 1990; Oakley, 1990; Dickson, Schneier, Lawrence & Hytry, 1995; Peters, Roney, Rogerson, McQuarter, Spring & Dale, 1999; Bruce & Bessant, 2002; Borja de Mozota, 2003).

Design is regarded as an active participant in the generation of innovation. Previous research exhibits that design can steer innovation through acting three roles: 1) as a mean on the generation of innovation; 2) as an agent knowledge that foster innovation; and 3) as a tool to improve design practices. The first role regards it as mean that either creates a better product through conceptual dimension or improves the innovation process through coordinating design at three levels (marketing time, project team level and learning process) (Borja de Mozota, 2003). Both actions depend on undertaking a process that either build ideas (converge a problem through identifying the source and forging the way) or formalize ideas (make ideas understandable and set up an idea processing system). The second role deems design as an agent that foster innovation in two distinctive ways (Bertola & Teixeira, 2003). Design as a knowledge integrator mediates the knowledge of technological capabilities developed inside global corporations through formal and structured methods for application outside intending to transform (desirably for the better) users' community knowledge. Design as knowledge broker promotes knowledge flow from outside to inside organizations to internalize it as a strategic resource for developing incremental innovation on products meaning and functions based on social and cultural trends generated by users communities. Design is envisioned as a multi-functional activity that can adapt to specific contextual factors and contribute to product development and business innovation in any given situation (Hargadon & Sutton, 1997; Hargadon & Douglas, 2001; Verganti, 2003; Hargadon, 2005). The third role regards design as a tool that improves practices through a proactive design and psychological theory (Lauche, 2005). Four criteria's are considered for job design: control over the design process, availability and clarity of design-relevant information, feedback on results, and management support. Any of these actions are possible if design is not stimulated and supported by the organization to enable designers to interact with colleagues proactively, to share relevant information and to learn collectively (Lauche, 2005).

DESIG SPECIALISATIONS:

Design has continuously expanded its scope and context transcending its practical expertise and intellectual deployment. This evolvement has given origin to new specializations that meet agendas

from business, social and environmental contexts. Businesses are becoming keen on three design specializations, design management, design thinking and design leadership.

Design management is a specialization that deploys design resources and manages design activities throughout the organization (Borja de Mozota, 2006a; Lockwood & Walton, 2009; Martin, 2009) to influence its internal and external performance (Borja de Mozota, 2006b; Chiva & Alegre, 2007; Design Council, 2009). It has evolved from a tool aimed to change styles and a source that support the new product development process into a contributor of leadership and a mean to design thinking (Borja de Mozota & Young-Kim, 2009; Cooper, Junginger, & Lockwood, 2009). It has built-up its capabilities to transit from a resource whereby organizations make design relevant decision and optimize relevant processes to a transformative force that use design as a strategic and purposeful activity (Gorb, 1990; Lockwood, 2010). However, its concept holds a fundamental contradiction, as design relies on creativity, exploration and risk-taking; meanwhile management favor control and predictability (Cooper & Press, 1999). The concurrent interaction of activities from both areas can lead to a danger when they overlap provoking diminution of scope and performance. Thus, researchers (Lockwood & Walton, 2009; Martin, 2009) emphasize the need to encourage designers to have close bond with managers, increase core competences and capabilities, and acquaint the value of design.

Design management can be posited at three different levels. At the corporate level, it links design, innovation, technology, management, and market across the triple bottom line of economic, socio/cultural and environmental factors (Gorb & Dumas, 1987; Dumas & Mintzberg, 1989). Designers are responsible to envision the strategic use of design, set directions and create environments that support strategy (Cooper & Press, 1999). Its value relies on improving the business financial performance and competitiveness, optimizing its levels of innovation, and creating its corporative brand (Lockwood & Walton, 2009). At the tactical level, it supports the product development process by way of coordinating physical and intellectual activities, and the outcome (knowledge) of these activities (Hollins & Hollins, 1991; British Standard Institute, 1999; Sebastian, 2005). Designers are on charge of transforming corporate strategies into tangible set of actions that allows generate innovation, foster innovation and improve design practice (Bertola & Teixeira, 2003; Verganti, 2003). The value of design centers on improving the NPD, determining the amount and rate of innovation, steering the dynamic acquisition of knowledge and producing meaningful outcomes that convey ideas, attitudes and values for future users (Lorenz, 1987; Walsh, Roy & Potter, 1992; Swink, 2000; Freel, 2003; Design Council, 2005; Department for Business, Innovation & Skills, 2005). At the operational level, it supports activities aimed to generate products, services and experiences for consumers (Best, 2006). Designers are responsible to manage and control design jobs among in-house or/and external designers (Sebastian, 2005). Its value focuses on considering key parameters that meet effectively and efficiently the goals of the project (Buchanan & Margolini, 1995; Birminghan, 1997; Bruce, Cooper & Vazquez, 1999; Cross, 2008). Nevertheless, design management depends on other design specializations to exploit its benefits.

Design leadership has its origins on the continual intersection between leadership, strategy and design, as designers are becoming active participants on strategic decisions. They involve on envisioning the future, manifesting strategic intent, directing design investment, managing corporate reputation, creating and monitoring the innovation environment, and training for design leadership. According to Kotter (1996, p. 25), ‘design leadership aims to define what the future look like, aligns people with that vision and inspires them to make it happen despite encountered obstacles’. The relation between design leadership and design management concentrates on the differences in goals, execution and results due to their respect outcomes source their development. Design leadership is in charge of describing future needs and selecting a direction to arrive at that future. Meanwhile, design management answers to given situations by the application of special abilities, tools, methods and techniques. Design management needs design leadership to know

where is going and design leadership needs design management to know whether it has got there (Fraser, 2009).

Design thinking has its origins on the use of tools, techniques and methods to approach different thinking styles (convergent and divergent thinking; serialistic and holistic thinking; or linear and lateral thinking) and to undertake analysis, synthesis and evaluations of the process development (Jones, 1980; Cross, 1984). Its role on today's context can be explored from different perspective, as a cognitive style, as a ground theory of design or as a resource for organization (Kimbell, 2011). Design thinking propositions converge on understanding what individual designers know (expertise), and how they approach and make sense of their work through iterative processes of exploration, generation and implementation. It is considered essential the action of thinking in any of its three dimensions: 1) thinking of (e.g. imaging, visualizing, ad dreaming up); 2) thinking about (e.g. consideration of, reflection on, and deliberation about), and 3) thinking through something (e.g. understanding, grasping and figuring out) (Cooper et al., 2009). The relation between design management and design thinking relies on externalizing, internalizing and materializing intangible information into tangibles outcomes to pursue new ideas or solve problems. Design thinking assists design management to produce and make sense of relevant information, take critical decision in projects, lead innovative practices, and transform business strategies (Jones, 1980; Brown, 2008). Design management supports design thinking through managing and communicating in sensible manner information, ideas and knowledge, making tangible the intangibles of the thinking process, and harnessing internal resources to deliver sustainable competitive advantages (Geraghty, 2008). This brief overview about the role of design in innovation provides indications that design management along other design specializations can assist entrepreneurs to develop technological innovations and introduce them into the market.

METHODOLOGY

This research addresses the research questions by building a logical rationale. It examines the context of study through intervention experiments in longitudinal case studies in small Mexican TBES to build theories within the practice context itself and test them there (Argyris & Schön, 1991, p. 86). Hence, the research adopts an exploratory and (mainly) qualitative approach to explore and analyze design management during the development of technological innovations. A framework was designed to undertake sequential qualitative methods to offer an emergent inductive theoretical outcome. This strategy is demanded considering the absence of empirical research addressing innovation, entrepreneurship and design studies.

DATA COLLECTION:

The experiment was centered on new technological industries. Exploring a set of industrial sectors provides the opportunity to unveil the condition of TBEs, as success and failure factors, knowledge and learning involved during the technological development will be likely to be more homogeneous (Moultrie, Clarkson, & Probert, 2006). Though, focusing on multiple industrial sectors brings disadvantages, as the technological and economic diversity in innovations differ (Coombs et al., 1996). The research was confined into a geographical area (centre of Mexico) to minimize sample variation, as environmental and external factors can have some influence. Empirical research was undertaken between February 2009 and February 2010. An instrument (questionnaire) was produced to provide an account of the firm's condition and its design abilities and capabilities.

A nine criteria document was produced to select prospect case studies (Table 1). Potential cases were approached through a liaison institution (CONACYT), as it is a trusted governmental institution. In addition, it funded the research and technological development of businesses (RENIECYT). A list of ten potential cases was provided to the researcher. Cases were randomly divided in two equal groups. The first group was used to explore and provide a general overview of the condition and use of design within the context of study, and the second group was utilized to

implement and assess design management. They were contacted through emails to introduce the study and schedule a meeting. A face-to-face meeting was required to ensure that they fulfilled the requirements of the study, to explain the participants' rights and to guarantee confidentiality and anonymity. All the cases from the first group participated and three cases from the second group.

Table 1 Case studies' selection criteria

Requirements	**Sub-variables**
Being a technology based enterprise	Use scientific and technological knowledge; undertake innovative activities; introduce (technological) innovations within the market
Small sized enterprises	Number of employees range from 1 to 50
Mexican enterprise	Owned by Mexican; National intellectual property (IP); Mexican workforce on its majority
Private organization	
Use design within its activities	Implemented either at the strategic, tactical or operational level; use any design specialization
Develop innovation continuously	Radical (new to the market or new to the world) or incremental
Being establish for more than three years	
Establish in new technological industries	Biotechnology, ecology, electronic, energy, new materials and telecommunications
Being active in the new product or service development	

RESEARCH PHASES:

The study was divided in basic research and applied research. The first section aimed to produce an overview of the context of study and an instrument that assist on assessing the cases. Secondary research was used to construct a theoretical framework and develop concrete questions about the utilization and application of design within small Mexican TBEs established in new technological industries. Then, primary research methods (semi-structured interviews and close-ended questionnaires) were employed to produce a general overview and a framework with themes, variables, items and scales to analyze future cases. Once the instrument was produced, the researcher tested its feasibility employing action research in three pilot case studies and workshops with three national academics. It was further analyzed with three cases and three international academics to secure its viability, content and structure.

The second stage pursued the introduction and assessment of design management interventions in three longitudinal case studies. The research instrument was employed as the main method to assess the condition of the subjects of study and their (design) abilities and capabilities. Meanwhile, case study was used as a supplementary method and it was triangulated with participative observations, documentation, archival records, feedbacks and physical artifacts to produce further evidence that support results. Three phases were considered in the pre-experiment. Pre-measurement phase assessed the case studies to produce a general overview. The results obtained sourced the interventions to produce personalized outcomes that assist on developing technological development. The post-measurement phase was undertaken after eight months of implementations to produce a set of results that could be compared with previous outcomes.

MEASUREMENT:

The research instrument has three sections, diagnostic framework, results and design toolbox. The first section has six levels to produce a general assessment of the firm's condition and its (design) abilities and capabilities (Table 2). They can be evaluated as a solely entity to provide a general review or as independent sections to isolate results. Quantitative parameters are considered in each level, excluding culture.

Table 2 Auditing the diagnostic framework

Audit level	Description
Company	Explores the management style of the firm, its organizational structure and taxonomy of innovation, as these factors determine how the firm operates
Strategy	Analyses factors that lead the firm to adopt and implement certain type of strategy Design – is centered in the management of corporative activities and the alignment of inter-organization decision-making
Process	Evaluates visible, tangibles and intangible actions that are directed to achieve a visualized outcome and (planned) strategy Design – actions that make the process efficient and effective
Project	Review all the individuals or collaborative enterprises that are carefully planned and designed to achieve a particular aim Design – helps to improve these activities and to obtain better results when they are evaluated against the satisfaction of market needs, costs, technological achievements, economical objectives, and technical quality
Product/service	Evaluates the levels of value delivered in the outcome of the final user in the product/services, as a response to needs and desires
Culture for design	Examines the form in which the firm configures and maintains its day-to-day activities, attitude and behaviors and long-term visions

The second section presents the outcomes obtained in a sensible manner to let owners and employees to understand their business situation. Results are displayed using five general assessments (Table 3). It regarded topics relevant to management style and organizational structure (Slevin & Covin, 1990), technological taxonomy (Jong & Marsilu, 2006), generic strategies (Poter, 1990), process performance (Cooper & Press, 1999; Bruce & Bessant, 2002), product and service value (Borja de Mozota, 2003) and culture ().

Table 3 Levels of assessment and their outcomes

Level of assessment	Outcomes
Company level	Management style and organizational structure: efficient bureaucratic; unstructured unadventurous; pseudo entrepreneurial; or effective entrepreneurial Taxonomy of TBEs: based in science and technology; based in intensive resources; being a specialized supplier; or dominated by the supplier
Strategy level	Types of generic strategy: leadership in differentiation; focus on differentiation; leadership cost; or focus on cost Design strategies: brand, market or cost
Process level/project level	Assess firms' planning, organization; implementation and monitoring, and evaluation Design assess designers' abilities and capacities during the process
Product/service level	Positions the product/service in four levels, superior, augmented, current and basic, according to the value delivered to end-users
Culture for design	Assess the attitudes and behaviors that prevail in the business Design consider the attitudes and behaviors employees have for design

The third section presents a series of tools, techniques and methods that aim to improve the abilities and capacities of employees and business performance. These sets of instruments are positioned under four axes that stand for the actions (sub themes) that are essential for businesses to keep working. Other two dimensions, areas of involvement and time relevance, were required to facilitating the use of these tools. Areas of involvement recognize the core areas (design, engineering, marketing and management) that are involved in the daily basis of businesses. Time relevance positions the different tools with respect to their importance to short, medium and long-term operations and strategies.

TERMS AND MEASUREMENT SCALE:

This section provides detail information about the content analysis used in the study. Thus, it is necessary to introduce terms and types of analysis (Table 4).

Table 4 Terms

Terms	Definition
Condition of the company	Prevailing situation influencing the performance or outcome of a process. Hence, it includes factors that can affect different levels and areas of the firm
Design abilities	Employees' possession of design means or skills to do proficiently their activities and tasks
Design capabilities	Extent of employees' ability to perform effectively and efficiently specific design activities and tasks
Performance	How successful the action or process of undertaking or accomplishing an action, task, function or operation is performed
Strategic level	Identification of long-term aims and interests and means of achieving them. It concentrates on managing corporate level activities and coordinating inter-organizational decision-making to translate ideas into actions and outcomes
Tactical level	Constituting actions planned to obtain a specific aim beyond the immediate action. Stages and tasks of the new product/service development process are considered
Operational level	All the procedures related to managing and controlling routine functions, actions and human resources

The instrument used a measure construct of 1-to-4 rating Likert scale, summative scale (Hussey & Hussey, 1997; Oppenheim, 2000; Balnaves & Caputi, 2001). This scale was utilized due to its uni-dimensionality facilities grouping results. The scale was pre-coded to provide a series of results according to the answer obtained. Results were analyzed and supported using multiple data source techniques. The scale reliability was evaluated through item variance: item means, item-scale correlation and coefficient alpha. The instrument was subjected to two analysis stages, in which 16 items were eliminated as in both evaluations rated low. The cronbach's alpha coefficients obtained high reliability coefficient in all sections: company (.921), strategy (.906), process (.967), project (.980), product/service (.945), and culture (.922). Case studies were studied for twelve months. They were first explored using the instrument and multiple data source techniques. Subsequently, the researcher implemented interventions and observed and documented changes experienced. The cases were subjected to the last assessment to contrast results from the first and second evolution. Employees from different levels were involved in answering the instrument, specifically the sections in which they have been involved and acknowledge.

Three major methodological concerns were considered during the research, impact of the researcher, causality and generalization. The first related to the researcher influence in the outcomes obtained due to her personal knowledge, skills and characteristics. Feedback is relevant to reduce potential bias on interpreting the impact of the research instrument. Causality was considered because in the development of a new instrument is difficult to attribute any observed effect to the procedural intervention (Malsen & Lewis, 1994). Feedback and triangulation of multiple inputs were used to address issues of causality as far as it is reasonably possible. Generalization represented a concern, as a small number of companies were used and analyzed through action research and case study methodologies (Warmington, 1980; Yin, 2003). Results were validated through actions and subsequent effects on the context under review. Nevertheless, a potential limitation of this work relates to demonstrate the external validity or generalization of the procedure (Yin, 2003).

DATA ANALYSIS

Results were synthesized to produce descriptive case that portrayed holistic and meaningful characteristics of corporate and actor life events (Yin, 2003). This allowed exhibiting circumstance and experiences that shape their technological developments (Table 5). While offering unique differences, Alpha, Beta and Gamma share key characteristics that are representative among small TBEs in developing nations (Olalde, 2001; Contreras, 2008). They face barriers in aspects

such as processes, culture, labor, finance and external information and linkages (Winterscheid & McNabb, 1994; De Toni & Nassimbeni, 2003). But, they also experience behavioral advantages that let them overcome lack of resources and managerial knowledge (Siu et al., 2006) in aspects like commitment among workers, motivated management, flexible organisational process, receptive to organisational and operational changes, personal and direct communications, and close relationship with customers/suppliers (Crick & Jones, 1999; Ledwith, 2000; Milward & Lewis, 2005).

Table 5 Background of the case studies

Cases	Industrial sector	Years of est.	Financial support	No. of staff	Innovative source	Type of innovation	Basis of outcomes	IP	Stage of tech progress
Case Alpha	Eco-technology	11	Governmental support; angel investors; stakeholders; bank loans; personal & family loans	46	Scientific & technological (cover customer needs)	New to the market	Feature & benefit	Patents	Prototype
Case Beta	Software virtual reality	6	Governmental support; personal loans	16	Scientific & technological (cover supplier needs)	New to the world	Feature & benefit	Copyright	Prototype
Case Gamma	Medical software	9	Governmental support; family loans	10	Scientific & technological (cover customer needs)	Incremental	Feature & benefit	Copyright; trademark; patents (process)	Prototype

Case Alpha - The innovator, who is a chemical engineer, was interested in finding alternatives to the great dependency of Mexico in oil and excessive pollution. His technological innovation centered on a cleaner energy technology (batteries). The entrepreneur did not want to be a supplier, herein he registering in 1999 a TBE centered on designing and producing hybrid vehicles. It presented its business plan in international competencies, investors and alliances to secured financial resources. They obtained resources to work for eights years to produce its first lightweight hybrid vehicles (prototype). Through the pass of time, the case started to experience financial constrains that provoked a halt on its technological development and a critical situation with investors. The entrepreneur searched for alliances to obtain either equipment or expertise to meet the demands of investors. It also offered services to have another entrance of resources. By 2009, it gained financial support from a Mexican governmental state to establish its manufacturing plant on its capital city. Since then, employees have directed all their efforts to produce 25 alpha prototypes for investors, which remain in the development and evaluation phase.

Case Beta – In 2003, the innovator, who is a software engineer, produced software as part of his master degree thesis. As it required improvements, he contacted public and private organizations and angel investors to obtain resources. At the follow year, he found an investor (current CEO) that proposed him to establish a joint venture. So, they registered a TBE in the software industry in the state of Hidalgo and sought for a law specialist (current operational manager) to complete the triad, innovation, management and law (IP). Meanwhile, the firm started promoting and selling their software, the innovator (project leader) started a new major technological innovation for mute-deaf people. This was continuously postponed due to the lack of financial resources, outdated technology, and scarce expertise. By 2006, it obtained financial support from a governmental institution to exploit its first technological development. Thus, employees invested all their energy to produce a manufacturing prototype. At the end of the project, they experienced a short entrance of financial resources provoking an extension on its portfolio of technological service into managerial consulting. In 2007, it obtained sufficient financial resources to produce a production

prototype that would lead them to attract more investors. Since then, they have been trying to improve their product architecture and software interface.

Case Gamma – The innovator, who is engineer, recognized an opportunity in the medical industry. The lack of specialized instruments in visual diseases for Mexican optometrists offered a market niche to produce affordable medical equipment. He undertook secondary research to explore the market and then primary research to understand the interface between product/service and final user. In 2006, the innovator established his TBE, as he obtained financial support from a governmental organization. His objective was to produce an Alpha prototype with resources obtained. An external engineer was hired to achieve this aim, but his lack of experience in this type of projects provoked exceeding costs and time. The firm herein started offering services related to its core expertise to continue redesigning the software algorithm and interface between software and hardware. Attainment of further financial resources allowed them to hire and external design consultancy to redesign the product architecture. Unfortunately, it did not have the expertise to undertake the project lingering the culmination of the final production prototype.

Single analysis of the case studies unveiled patterns that exhibit innovators' abilities and capabilities to undertake technological innovations along with the evolvement of their businesses. Technological development was composed for five broad stages (ideation, prototyping, development, manufacturing and culmination) that move back and forward between stages in iterative manner. Business development had three stages (start-up, development and growth) that are determinate by their technological development status. Start-up stage represents the interval in which firms exploit a technological idea to generate a business proposition and exhibit it viability through a business plan and alpha prototype to gain access to financial resources to complete it. Development stage relates to the business evolution into a semiformal organization, as there is a flow of financial resources allowing continual operational activities. Growth stage depicts the moment in which firms become financial semi-independent from third parts.

Figure 1 displays the transition of entrepreneurial and technological actions and intentions and innovators/entrepreneurs capabilities during the technological and business development. Case studies experienced an extensive use of entrepreneurial actions and intentions in their origins. But, this tendency steadily decline during the development and growth stages. Whereas, they had a weak start on their technological actions and intentions, but this tendency change as they reach their peak at the growth stage. These results exhibit the transition of capabilities that are directly driven by the learning process of innovators and technological innovation. Entrepreneurs are force to continuously learn new knowledge (from starter to proficient learner). First, they need to stimulate the emergence of knowledge through identifying, gathering and absorbing relevant information from external resources (acquisition), as they do not have previous experience/knowledge of the activities/actions that are aiming to undertake (starter). As they continue learning a specific set of knowledge (apprentice), it becomes necessary to incorporate the novel inputs/ideas into their technological development (assimilation). When innovators are capable to converse their internal expertise into path-breaking insights (transformation), means that they have comprehensive and authoritative knowledge or skills in a particular area (expert). Once they have skills in doing something proficiently, it is possible to effectively apply this know-how to new combinations of knowledge (deployment).

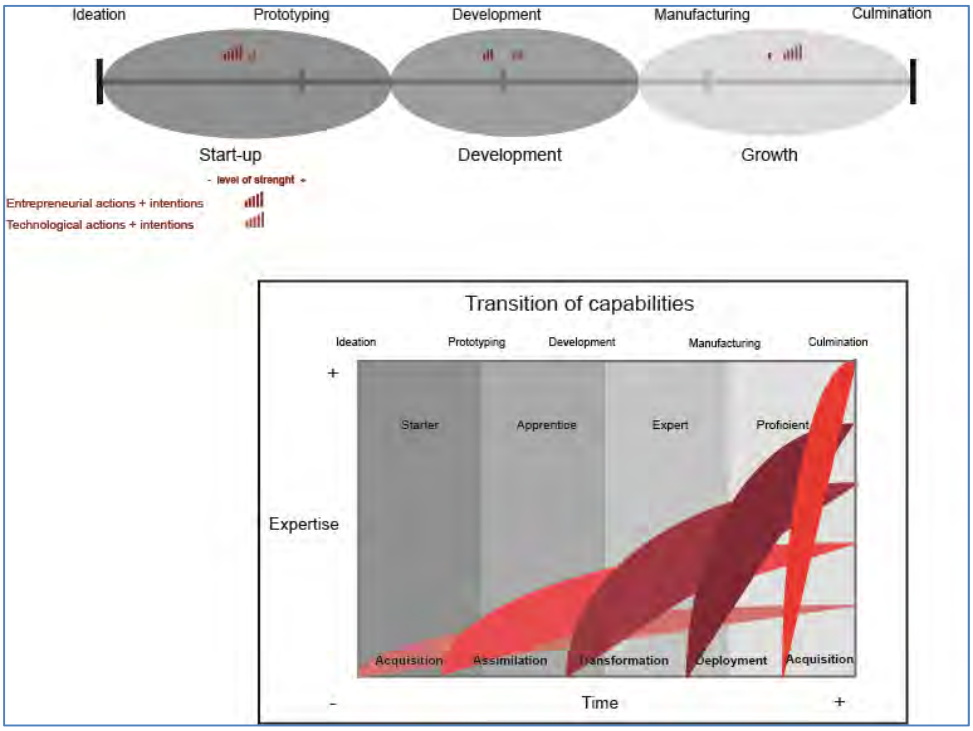

Figure 1 Technological development and its capabilities transition

Along with the evolvement of abilities and capabilities, different strategies were adopted during the technological development. These strategies tend to be aligned with decision-making actions that shape the technological innovation and business evolution. Five decision-making actions were unveil, origin of the technological innovation, attainment of liquidity, development of the innovation, search for liquidity and diversification of activities, and preparation on the introduction of technological innovations. Four distinct strategies were undertaken by the case studies. Human capital development strategy was adopted to allocate work modes, recruit personnel, train existing personnel and develop functional divisions. Then, a product development strategy was adopted to capture the intensity of innovation effort within a technological domain. A process development strategy was implemented to capture the intensity of innovation efforts aiming to increase the efficiency and effectiveness of internal production process. A market development strategy was considered to create or adapt a product line to new means to face the breadth of the geographic market served and to pursuit new distribution channels. Caution has to be considered, as strategies were positioned in certain period of time to exhibit their relevance, although they remained on the innovator's agenda.

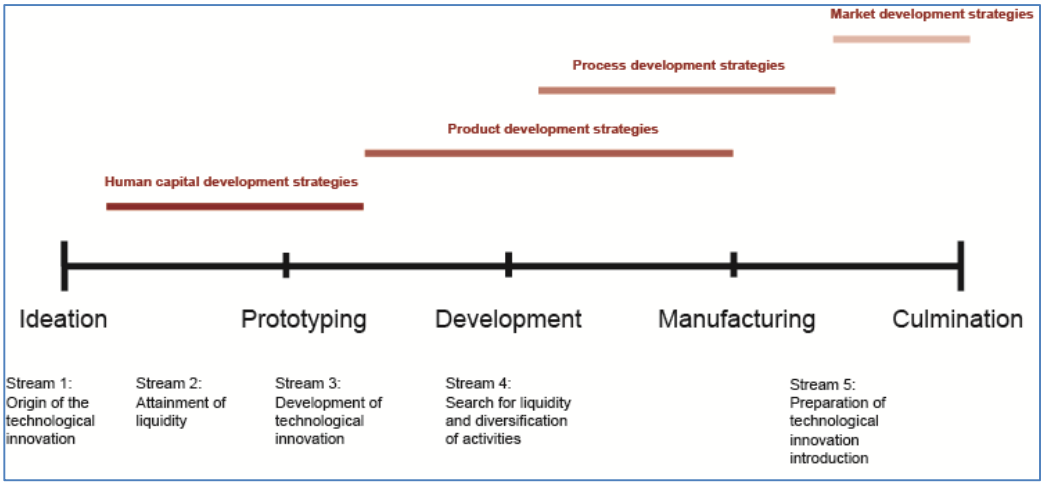

Figure 2 Strategies adopted during the technological development

Once it was produced a clear description of the cases studies, it was possible to continue with the pre-experiment analysis. Table 5 presents the results obtained from the pre-measurement and post-measurement phases of the three case studies. General results show that case studies had a propensity to invest on high-intensive scientific and technological activities and developments. After the implementation, they re-orientated their technological developments and operational alignments. They also have an inclination to adopt two generic strategies concurrently without overtly recognizing it. But then, they establish simultaneous strategies to tackle small and long-term goals. Enterprises experienced a deficient process development performance, as CEOs and employees did not have previous experience on designing new product platforms. Later, Alpha and Gamma encountered progress in organizing human and operational activities through implementing systems of information. At the project level, Alpha and Beta experienced problems in managing, documenting and communicating knowledge produced. Later, both encountered progress in organizing human activities, designing environments for innovation and creating systems for managing outcomes of the technological development. Their products/services met basic and actual elements and barely regard augmented and superior elements. After the interventions, Alpha and Gamma experienced statistically significant improvements. The three cases had a positive culture, although, there was not a culture for design. After the intervention, employees become aware of design and how it interacted with their activities, especially in supporting processes and projects and improving performance and competitiveness.

Alpha exhibits a change on managing the organization moving from a pseudo entrepreneurial firm to an effective entrepreneurial and efficient bureaucratic firm. Its technological taxonomy also changed from an intensive resource business to a combination of specialized supplier and dominated by the supplier. It had a double strategy in which prevails a cost reduction on the product's introductory price, seconded with differentiated outcomes. At the post measurement, it pursued a concurrent strategy in which differentiation takes the lead, and cost strategy assist on reducing costs in the production phase. It had a poor and inexperienced process development line, but after the interventions it improved on organizing available physical and intellectual resources. Design was used as a resource to reduce cost and meet partial in-house demands. After, it was used to convey firm's values to build trust among customers, and to improve operations. Its project performed poorly due to its inexperience, but after it improved in organizing and implementing activities at different stages of the development. Its product also shows advancement in the consideration of more elements on the augmented and superior level, as it previously considered few features. It exhibits major design involvement on the business operations.

Table 5 Pre-measurement and post-measurement assessment of the case studies

Level	Alpha		Beta		Gama	
	Pre-measure	**Post-measure**	**Pre-measure**	**Post-measure**	**Pre-measure**	**Post-measure**
Company	Effective entrepreneurial 25.8% Unstructured unadventurous 25.8% Pseudo-entrepreneurial 32.26% Effective bureaucratic 16.14%	Effective entrepreneurial 32.5% Unstructured unadventurous 15% Pseudo-entrepreneurial 25% Effective bureaucratic 27.5%	Effective entrepreneurial 35% Unstructured unadventurous 12.5% Pseudo-entrepreneurial 35% Effective bureaucratic 17.5%	Effective entrepreneurial 7.4% Unstructured unadventurous 37.75% Pseudo-entrepreneurial 33.3% Effective bureaucratic 23.81%	Effective entrepreneurial 19.44% Unstructured unadventurous 27.78% Pseudo-entrepreneurial 30.56% Effective bureaucratic 22.22%	Effective entrepreneurial 10.71% Unstructured unadventurous 57.14% Pseudo-entrepreneurial 21.40% Effective bureaucratic 10.71%
	Technological taxonomy					
	Science and technology 30% Intensive resources 50% Specialized supplier 20% Dominated by supplier 0%	Science and technology 11.1% Intensive resources 0% Specialized supplier 44.45% Dominated by supplier 44.45%	Science and technology 64.29% Intensive resources 21.43% Specialized supplier 7.14% Dominated by supplier 7.14%	Science and technology 0% Intensive resources 25% Specialized supplier 41.46% Dominated by supplier 33.33%	Science and technology 11.12% Intensive resources 44.4% Specialized supplier 44.4% Dominated by supplier 0%	Science and technology 33.3% Intensive resources 22.2% Specialized supplier 33.3% Dominated by supplier 11.12%
Strategy	Leadership in differentiation 20.2% Focus on differentiation 26.6% Leadership in cost 26.6% Focus on cost 26.6%	Leadership in differentiation 37.9% Focus on differentiation 17.24% Leadership in cost 20.69% Focus on cost 24.14%	Leadership in differentiation 27.62% Focus on differentiation 41.38% Leadership in cost 13.80% Focus on cost 17.20%	Leadership in differentiation 21.88% Focus on differentiation 18.75% Leadership in cost 28.10% Focus on cost 31.27%	Leadership in differentiation 28.60% Focus on differentiation 28.60% Leadership in cost 19% Focus on cost 23.80%	Leadership in differentiation 36.36% Focus on differentiation 31.82% Leadership in cost 13.64% Focus on cost 18.18%
Process	5 – 8.75% 4 – 18.175% 3 – 18.425% 2 – 6.85% 1 – 48.175%	5 – 13.5% 4 – 17.725% 3 – 17.5% 2 – 43.03% 1 – 14.325%	The case did not evaluated the process level as it does not have one		5 – 8.05% 4 – 33.68% 3 – 9.22% 2 – 6.2% 1 – 42.85%	5 – 16.82% 4 – 9.825% 3 – 4.035% 2 – 12.96% 1 – 56.36%
Project	5 – 21% 4 – 3.35% 3 – 4.85% 2 – 9.875% 1 – 60.925%	5 – 11.1% 4 – 14.025% 3 – 17.5% 2 – 43.05% 1 – 14.375%	5 – 59.975% 4 – 18.2% 3 – 7.825% 2 – 2.325% 1 – 11.675%	5 – 66.025% 4 – 22.15% 3 – 6.225% 2 – 2.5% 1 – 3.1%	The case did not evaluated the project level as it does not have one technological project during the time of study	
Product / service	5 – 22.9% 4 – 22.5% 3 – 29.9% 2 – 6.95% 1 – 18%	5 – 62.52% 4 – 18.054% 3 – 13.175% 2 – 2.075% 1 – 4.175%	5 – 23.6% 4 – 4.175% 3 – 3.475% 2 – 3.475% 1 – 65.275%	5 – 47.775% 4 – 9.85% 3 – 9.025% 2 – 8.35% 1 – 25%	5 – 25% 4 – 35.15% 3 – 7.3% 2 – 6.25% 1 – 26.30%	5 – 33.35% 4 – 22.925% 3 – 11.45% 2 – 8.325% 1 – 23.95%
Culture	5 – 8.6% 4 – 42.9% 3 – 28.6% 2 – 12.9% 1 – 7%	5 – 28.6% 4 – 8.6% 3 – 18.6% 2 – 22.9% 1 – 21.3%	5 – 0% 4 – 14.2% 3 – 67.9% 2 – 17.9% 1 – 0%	5 – 30.8% 4 – 44.2% 3 – 3.8% 2 – 0% 1 – 21.2%	5 – 0% 4 – 21.4% 3 – 39.3% 2 – 25% 1 – 14.3%	5 – 42.9% 4 – 14.3% 3 – 14.3% 2 – 17.9% 1 – 10.6%

Beta moved from a pseudo entrepreneurial and effective entrepreneurial firm to an unstructured unadventurous pseudo entrepreneurial firm. Its technological taxonomy has also changed from a science and technology based firm to a specialized supplier business. Its strategy was based on differentiation with a tendency to reduce costs on processes and materials affecting its outcome. After the intervention, it applied two clear strategies, a cost strategy to reduce expenses on operations and a differentiation strategy to promote its technological innovations. Its project performed efficiently, but after the interventions it experienced improvements on facilitating

innovation, creating innovative environments, and retaining tacit knowledge. Design was utilized to improve its communication in the market, and to trigger new ideas and manage tactical developments. Its prototype considered rudimentarily augmented and superior elements. After the intervention, it strengthened its basic and actual level characteristics to produce an outcome with superior values. Its culture empowers employees to take major decisions and become more participative in the development of technological innovations.

Gamma has an unstructured unadventurous structure since its origins to respond to the market and industry demands. Its technology taxonomy moved from technological intensive resources and specialized supplier business to base in science and technology. Its strategy focused on differentiation, but later they seek for a cost strategy to tackle barriers and limitations on the development, production and distribution. Its process performance was competent leading to further strength its management, communication and evaluation of physical and intellectual actions. Design was employed as an instrument to improve the outcome's architecture and appearance. After the intervention it assisted on shaping strategies and meeting market needs, conveying firms' value to build trustworthiness and reputation, and triggering innovation. Its product/service considered some basic and actual elements and few augmented and basic features. After the intervention, it realized the need to invest further resources to meet superior product/service characteristics.

DISCUSSION

This study has sought to investigate whether design management is a viable resource to assist entrepreneurs in the development of technological innovations. Its purpose was not dispute previous design management (other design specializations) results that exhibit positive effects within medium and large-sized enterprises in developed nations. Instead, it explored detailed improvements into a specific context to enrich current practical and theoretical knowledge of entrepreneurship and design management nexus. Results highlight specific activities and outcomes that evince entrepreneurial positive changes on the case. It assisted entrepreneurs to become aware about their overall condition; to make-decisions in risky and uncertain environments; to deploy tangible and intangible resources at the operational level; to trigger innovative thinking and transform knowledge into tangible outcomes; and to assimilate information and control and manage cycles of innovation.

Findings infer that the relation design management-design leadership raises awareness among entrepreneurs about the condition of their technological development, business, market and industry. This, in turns, facilitated shaping strategies and implementing tactics. Hence, entrepreneurs have to deploy knowledge (captured or/and produced) and capabilities throughout the organization. Evidence also exhibits that the cases implemented design as a conduit to introduce technological developments into the market. It is suggested that these roles are possible due to small Mexican TBEs have an overlap at their different levels of action facilitating the dissemination of knowledge. These results corroborate findings of previous work centered on the implementation of design management in large-sized enterprises and introduction of design expertise (Tunstall, 2000; Sebatian, 2005; Lockwood, 2009). This infers that design management-leadership might be a resource to acquire relevant information from external resources to adopt fit strategies, to link the transition and translation of strategies to operations, to transform it into a path-breaking insight, or assimilate it into an internal expertise.

The collaboration between design management-design thinking assists entrepreneurs to trigger innovation and modulate cycle of innovation during the technological development. Both actions have a modular activity that is transfer knowledge, information and ideas into tangible outcomes. Results indicate that the use of tools, methods and techniques allowed employees to transform scientific and technological knowledge into actions. Similarly, they were able to balance scientific and technological knowledge and market knowledge, and modulate convergent and divergent cycles of innovation. But above all, these instruments facilitated the learning process, in which

employees acquired, assimilated, transformed and deployed new capabilities and the absorption of suspended knowledge from core expertise and peripheral expertise spheres. The integration of design management in the technological development of small TBES is absent in current literature. But, results support research that exhibit design as an instrument to trigger of innovation in the product development process (Twiss, 1992; Roy & Wield, 1995; Cross, 2008; King & Anderson, 2002). These insights raise expectations about their role on dynamic capabilities in integrating, building and reconfiguring internal and external competencies to support sustained innovativeness (Branzei & Vertinsky, 2006). Entrepreneurs may be benefited using design management-thinking to exploit the learning process and absorptive capacity.

The intrinsic relation between design management-design thinking-design leadership supported entrepreneurs to make-decisions in risky and uncertain contexts through the production of comprehensive and holistic future propositions. Entrepreneurs/innovators used design because they are predispose to invest resources in areas that procure results on desired times or creative outcomes that mitigate lack of resources. Results corroborate findings of previous works originated on the field of design leadership and design thinking and no mainstream entrepreneurship or management theory. Research on design thinking has explored the use of design tools, methods and techniques to connect knowledge in design processes and knowledge embodied in design outcomes (Jones, 1980; Voguel et al., 2004; Laurel, 2003; Tether, 2006; Cross, 2008). When design thinking is used along with design management at the organizational level, it transforms business strategies and the way organizations do business (Cooper et al, 2009). On the other hand, research concerning with design leadership has explored the intersection of leadership with design strategy (Gloppen, 2009) in revealing the potential of design as a transformative force in business and society. However, it has not been explored the intersection and relation between the three fields of study. Design can support entrepreneurs in taking decisions that lead them to formalize their operations and consequently introduce their technological development into the market.

CONCLUSION

This empirical study explored design management as resources to assist entrepreneurs/ innovators in the development of technological innovations. Findings exhibit evidence about the roles that design play on assisting Mexican entrepreneurs/innovators in TBEs in new technological industries. Outcomes contribute to the field through extending its theory and application under different contexts of study. It explored new roles of design management and further links with other design specializations to shape future innovation paths.

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FROM ECO-NOMY TO ECO-PATHY. A DIFFERENT MODEL OF SUPPLY-CHAIN FOR DESIGN.

Loredana DI LUCCHIO*

Nowadays, within the productive, social and cultural scenario where Design acts, a new emergency is growing: a need to redefine the relationship between the different stakeholders of the supply-chain (from producers, to designers, to consumers).
In particular, due to the process of globalization - which has completed his first maturation - we are assisting to the loss of the consolidated roles and the birth of new players; in fact, more then the 'prophesied' improvement of social economic and productive exchanges, there is an increasing gap between who is able to access to the global system and who remains in a more local condition.
Is it possible to image a different geography to valorize also the local players? Could be Design a leverage for this?
The project reported in this paper is an experimental research (according to the approach of action research) which investigates, analyses and tests a different model of relationship between the players of the design-production-consumption process.

Keywords: transformation design | experiential territory | social-economic growth

BACKGROUND

In the 1960s and 1970s - during the crisis of the Fordist production model which has been recognized as the start of the irreversible decline of large industrial firms and of the hierarchical function structures - someone discovered that for some groups of small companies in certain Italian regions the trend was different: the employment remained steady, there was frequent innovation and exports were increasing.

This 'strange' phenomenon became the focus of a national and international debate: and it was soon revealed that the territorial locations of these companies were not dictated by chance, but they had roots in territorial systems with some singular social characteristics.

This was the "small is beautiful" phenomenon, which borrowed its name from an important book by the economist Ernst Friedrich Schumacher (1973) which criticized Western economies and favoured the adoption of more human-oriented, decentralized and appropriate technologies.

This has been also the quintessentially Italian phenomenon which showed that the advantages of large-scale production could also be obtained by a network of small companies that were located near to each other (Beccattini, 1989).

In this new vision, the concept of 'territory' passed from to be the focus of social and cultural outlooks to be the focus of economic views of production processes: the concept of 'territory' is a means of communication, and a vehicle and focus of work, production, interaction and co-operation (Dematteis, 1985).

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Communication, work, interaction and cooperation weren't simply economic characteristics. They were the various social relationships that individuals and the group as a whole had in a specific time and place: they are James Coleman's "social capital", based on "authority", "trust" and "regulatory" relationships (1988).

In this fertile breeding ground, a unique bond between design and production emerged and developed around the same forms of relationships. And this design wasn't just one of the activities in Porter's value chain: it was a key player within the territorial 'social capital system'.

Inevitably, a huge distortion on this territorial relationship-based business and design model was over the last twenty years: years during which there been the completion of that globalization process discussed in economic field of '60s in its positive sense as a phenomenon of progressive growth of international interaction.

CONTEXT

Leaving aside more complex economic or sociological definitions, globalization could be considered as a multi-faceted phenomenon. It is based more on the evolution of relationship systems than on simple exchanges of goods: and rather than making any things or processes more uniform (as someone feared), it has led to a bigger gap in the nature and speed of social development. It has driven a slow process of deconstruction of existing contexts and of redefinition around a map based on opportunities rather than proximity.

In fact if, on one hand, the so-called 'global economy' has given the companies the possibility to produce and sell products and services all over in the world, to develop global joint-ventures and partnerships, to delocalize different production steps in different countries, to diversify their 'presence' in different market under different brands; on the other hand, 'globalization', which represents just a contemporary expression of the geo-political evolution, has demonstrated a substantial inability at the self-determination, emphasizing the differences between the social communities (not necessarily between the nations) and pushing to the extremes the different roles within the process of value construction and value consumption (2011, R. Dani).

All this is so relevant that, for the purposes of this discussion, it should be more correct to consider not the concept of 'globalization' but the concept of 'global village' as it has been defined, for the first time in 1964 by Marshall McLuhan: a world which becomes metaphorically 'small' due the new (digital) technologies, where each communication is simple and amplified, each physical distance is cancelled, and more than goods exchanges there are exchanges of behaviours, languages, life-styles and people.

Again, with his work 'War and Peace in the Global Village' (1968), it will be McLuhan to clarify how this amplification of communication doesn't mean an hegemony of a 'depersonalized global vision', but the stimulus for discontinuity, diversity and division more than was in the 'past mechanical world'.

Therefore, 'globalization' is not homologation but construction of new equilibrium based more on social and economic exchanges (knowledge, people, capitals) than on physical exchanges (goods).

This meant a profound alteration of proximal relationships, especially from the start of the 21st century, and the 'territory' has lost for production, and therefore for design, its relevant role of 'place where the things happen': the nationality of designers (as expression of a specific cultural background), the place of production (indicated with the 'made in' in order to guarantee the quality level of manufacturing), the place of consumption (expressed as specific features of different markets).

Instead, especially thanks to the digital technologies, nowadays we assist to a significant relocation (in the etymological sense of ‘removing from a locality’) which is not finalized to ‘a collocation in other places’ but to cancel any permanent form of places.

In this way for any of previous three aspects of process, ‘territory’ has a different value: for the design activity it becomes multiple (not more one designer but several designers whose their cultural and geographical ‘origin’ is heterogeneous); for the production it is made of several different places and ‘designed in’ becomes more important than ‘made in’; for the consumption activities it is linked not more to a specific local market but to niches of consumers (communities) similar for needs and desires despite their different social and geographical origin.

Therefore, a different scenario where ‘territory’ moves from a fixed condition to a moving condition.

‘Moving condition’ where the levels of interaction are different: a) a first level linked to the origins, in which the territory gives rise to the creation of companies and provides the know-how on which the businesses are built; b) a second level linked to development, in which territory is the place where companies find the resources to conduct their business and increase their profits; c) a third level linked to the network, in which territory no longer has physical points of reference but interacts in a virtual manner, using unions and partnerships as ways to “extend” the territory.

This change could be described as a passage from the domain of the economy to the domain of ‘*ecopathy’* where the suffix *-nomy*, as norm, is replaced with the suffix *-pathy*, as feeling the other. This means to move the focus from the system rules to the relationship value: and the value is obtained not thanks to a simple sum of capabilities of each players but to the overlap of the different skills.

The concept of *ecopathy* could be considered a sort of evolution of the background where design acts (Di Lucchio, 2005).

In fact, at the beginning of Design as discipline, the theoretical debate has been focused on the strong connection between the design capability to define the ‘material equipment’ of modern society and the capitalistic approach to production and consumption according which the system has a self-determined process based on the market and the economy (in its etymological sense of ‘the way to manage the house’) has the rule. (Maldonado, 1977).

After, due the big crisis of ’70, where the ‘simplistic’ imperative to the ‘growth’ has been refuted to the awareness that the exploitation of natural resources isn’t an endless process, a new approach to the system emerged strongly in search of a balance between the human system and the natural system according to a mutual logic and without need of any imposed abstract norm: ecology (Papanek, 1971).

In this beginning of new century, a new approach is growing in the awareness that just the ecological reply to the capitalism defects isn't enough because now the global society is living a deeply redefinition of its rules, and where not only the natural system is in danger, but also the human system. Therefore the approach isn't more neither to the simply definition of new rule (economy approach), neither to the totally respect of the natural logic (ecology approach), but to the construction of a different and new relationship between all players - human, natural and social players. Therefore *ecopathy*, where the focus is on the 'pathos', on a feeling of 'sympathy', on the capability to consider others (other’s need and role) within our processes.

PRACTICE

In order to pass from a theoretical dissertation to an experimental evaluation, a research project based on this vision, has been developed by Sapienza Design Factory, which is a research laboratory focused on the improvement of the Design role in the productive system.

This experimental project, titled TOOTable[1], is the result of one year research action (2010-2011) focused on Italian furniture sector, which represents one of the key business and maybe one of the most renowned: the magical combination of between creativity of designers and informal entrepreneurial genius, the manufacturing miracles of districts, the flexibility of small companies, the high share of export.

In term of management, this is a very mature sector with a consolidate (and simple) supply chain: brands companies, production suppliers, designers, sellers and of course consumers.

Moreover this sector represents an emblematic case of the traditional district model which, until last 15 years, was based on a strong relationship between brand companies and a network of suppliers located in the same region (Lojacono, 2007).

Thanks to a direct analysis of some furniture districts and an annotated reading of the annual reports of the Italian Furniture Association Federlegno, it has been possible to verifies some interesting features which are changing the furniture supply-chain. In particular the Annual Reports of Federlegno in 2008, 2009, 2010 were been analyzed in order to map also the economic trend of the furniture sector in Italy.

Of course, due the modified scenario of globalization, also this sector has suffered some shocks which have deeply change not so much the production organization but the contexts (‘territories’) where these companies act.

The primary change has been about the relationship between the brand-companies and the supply-companies, due the delocalization of production in order to downsize costs. Several supply-companies located in the districts have been substituted by companies of the west countries which offer more low costs of production.

The second change is about the relationship between companies and designers because the need to maintain an high level of brand reputation these companies prefer to involve only of 'famous designers' as assurance of market success. And, more and more often, these designers arrive from all of over the world: the only evaluation factor is the level of notoriety (Di Lucchio, 2006).

And a further change is about the market competition, or better, the market perception which moves towards the high-end consumption in order to obtain more high profit margins working on brand appeal and reputation (Roberts, 2004).

At the end, it is possible to assert that the italian furniture sector (and its market) is divide in: few important design-oriented brands (almost all Italian brands) which offer high-end products dedicated to small niches of wealthy consumers; some middle-brands which work as followers however positioned in the medium-high market; only one world-wide famous brand which offers a (almost) ‘perfect’ combination of medium quality and low prices (IKEA); and, finally, a big number of very small companies which are working (or better, worked) as suppliers for the big brands, without any capability to directly face off the market.

In this scenario, two barriers are growing within the furniture supply chain, which are excluding, on one hand, young designers, which haven’t yet a strong media appeal, and in the other hand a large part of consumers who haven't the economic capability for this kind of purchases (so-called middle-class).

Figure 1 The traditional supply-chain of the Italian (and European) furniture sector. Source: Di Lucchio, L. (2012)

But the more critical effect is a slow but constantly disappearing of small and micro companies which have a high quality level of technical capability but no opportunity to compete in the globalized market.

The project TOOTable⌜ starts from these criticalities applying the idea of relational territory as a different approach for the supply-chain, based on the business model of ‘zero-miles’, and exploiting three assets:

- the desktop-manufacturing, micro-companies and production laboratories which use rapid manufacturing machines with a high flexibilities of processing and an indifference to the economies of scale;
- the design do-it-yourself based on the opportunity opened by CAD to overlap the figure of designers with producers;
- the web 2.0, which thanks to social networks opens advanced sharing spaces.

Each of these assets enables a new way to approach at production, and on their overlap is defined the core concept of the TOOTable⌜ project. In fact:

The desktop-manufacturing represents the last step of a technological evolution started with the CAD (Computer Aided Design) and the Solid Modelling and 'landed' at the Rapid Manufacturing processes (RM). These processes allow to produce a solid object, complete in each its parts, without any manual intervention, and starting directly from its morphological definition by a 3D virtual model. A virtual model which represents the mathematical instruction for the mechanical machines, so-called CNC machine (Computer Numeric Control) if they work removing (or cutting)

material, or called RP machine (Rapid Prototyping) if they work adding material. These technologies had demonstrated that, if they are moved by a preliminary phase of production simulation (engineering phase) to a effective phase of production, can be able to bring close the ideation process and realization process; processes which the industrialization has delegated to different actors in different time (the concept of Fordist line-production).

Moreover, these technologies have become one of the most interesting place of experimentation for engineers, designers, creators in general or, in a word, 'makers' (C. Anderson, 2011). The 'makers' are those new players which are able to manage the entire process of ideation-production-consumption: building a condition similar to the craftwork but contextualized in those cognitive post-industrial processes (time-to-market, wide-knowledgement, customization, self-production) where the creator coincides with the executor. This phenomenon has been recognized (and called) as 'design do-it-yourself ': a combination of web-enabled open sourcing and cheap manufacturing technology is the key to creating a next generation of innovators and entrepreneurs in manufacturing.

Finally, the most important feature of 'web 2.0' is to consider the network as a platform for sharing information, experiences, activities in a interactive and dynamic way in contrast with the most passive approach of traditional web-users. In particular, thanks to some specific activities – social networking sites, blogs, wikis, video sharing sites, hosted services, web applications, mashups and folksonomies – web consumers becomes the more emblematic expression of those 'prosumers' theorized by Toffler (1980)

According to these opportunities, TOOTable tried to image a different supply-chain for the furniture sector (design oriented) able to reply to the described need of *ecopathy*.

Under an organizational point of view the project has been organized and developed as a network, both physical and virtual. These is its structure.

The 'double' network is managed by a 'Production Board' which has, as well as an editorial board, the role to maintain constant and rich the information sharing between several actors involved, and also to guarantee the correct developing of processes and to avoid any abuse of the system (economic or cultural abuse).

In particular the 'Production Board' manages the social networking site which is developed also for e-commerce.

The actors involved can be divided in 4 groups:

- the 'DIY Designers', normally those young designers, newly graduated, which still haven't any collaboration with companies (especially with the famous brands) and normally invest in a self-promotion of their projects;
- the 'Makers', those very small companies or those laboratories which have one or more Rapid Manufacturing technologies and, despite an high level of capabilities, can't compete with the low-cost production of east countries;
- the 'Gallerists', those small Art and Design Galleries which are now very diffused in the urban context and are interested to promote and sell limited collections;
- and the 'Consumers', which represent a growing trends in the nowadays market behaviours and which are characterized to an high attention both to the quality of products and to the social impact of production (as, for example, the consumers of organic foods, or of fair trade products).

Of these, the Consumers interact with network occasionally, while the other three must be officially involved in the system, as 'Local Hub'.

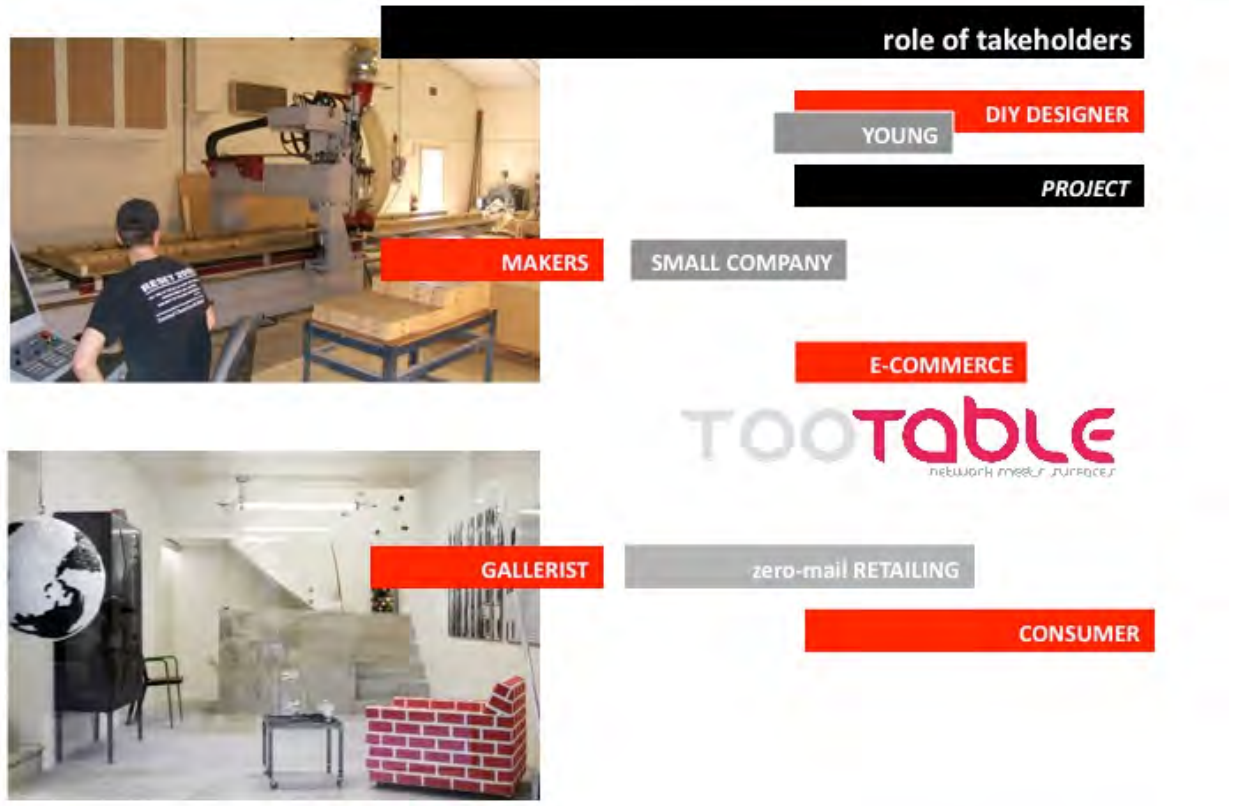

Figure 2 The TOOTable stakeholders and their roles. Source: Di Lucchio, L. (2012)

The 'Local Hub' is the core of the organizational structure and it replies to the approach of 'zero mile'. This is how the Local Hub works.

If a 'DIY Designer' wants to be part of TOOTable network, they can submit to the 'Production Board' (by website login form) their projects describing all technical details for the production processes. In particular, the 'Production Board' verifies if each product reply to the features of TOOTable collection: furniture which can be produced with the Rapid Manufacturing technologies (also by the CNC technologies) and can be sold disassembled in order to reduce at minimum the packaging size (and also the packaging weight).

In the same way, a 'Maker' in order to be part of TOOTable network, must submit its skills profile describing which production processes it can manage.

Finally, the 'Gallerists', interested to be part of networking must be describe, in the website login form, their activities, their exhibition and retail space.

Of course, each of these different stakeholders is located in a geographical region and when some of them are in the same region become a TOOTable 'Local Hub'. But the most interesting feature of TOOTable is that, when a stakeholder becomes part of it, he can involve another one with different role but located in the same city or region (according to the formula "share with a friend") forming directly a 'Local Hub'.

At this point the process can start.

Figure 3 Home pace of the TOOTable website. Source: Di Lucchio, L. (2012)

Figure 4 Products page with all information about morphological and technical features and with the links to the e-shop. Source: Di Lucchio, L. (2012)

One DIY Designer realizes together with the Maker of the same Local Hub, one or more copies of his project which will be showed by the Gallerist of the same Local Hub. While, in the TOOTable website a new page dedicated to this product is opened.

The Consumer can see, and eventually buy, a piece of TOOTable collection in the website or visiting the Gallerists presents in the city (or region) where he lives: in this second case, the Consumer can 'touch' directly the furniture designed and realized in the 'Local Hub' and see the others in a web point dedicated to the TOOTable and located within the Gallery.

If the Consumer chooses the furniture present in the Gallery, he can directly buy it; if he desires to buy another one, the TOOTable network is 'setting in motion'.

From the website, a communication arrives to the DIY Designer author of the selected product, with indicated in which region the Consumer comes from, and which is the more closer Local Hub to him.

The DIY Designer author must send to the DIY Designer of the Local Hub near to the Consumer, the technical draws to allow the Maker to realize the product. Then the product will be taken over by the Gallerist - also from the same the Local Hub – which contact the Consumer in order to deliver him the product.

In this way, despite the geographical distant between the DIY Designer author and the Consumer, each product is realized and sold with a more 'zero-miles' approach possible. Moreover, in order to improve zero-miles purchases, when a Consumer chooses a product on website, and proceeds to login for the e-purchase, a sort of 'traffic light' warns if this is a pure zero-miles purchase (green light), a medium zero-miles purchase (yellow light) or no zero-miles purchase (red light).

On the economic pint of view, TOOTable system tries to follow the approach of fare-trade. In fact, any stakeholders obtain a profit in relation of his real involvement: the DIY Designer author has a profit from his design activity, the DIY Designer of Local Hub has a profit from his activities as product manager, the Maker of Local Hub has a profit from the production phase, the Gallerist of Local Hub has a profit from the selling activities. And of course there is a percentage of profit for the Production Board for its management, strategic development, and promotion activities.

CONCLUSION

This research project, based on approach of action research (Burns, 2007), wants to be a shift from the features of territorial districts – as complete, morphostatic systems – to open towards morphogenetic systems: systems which move in a constant process of self-definition, causing the own shape.

A new geography can be drawn up, where the processes not are a weakening of the established cultural interaction, but a revitalization which leads both to transformation of symbolic value (of the image and conception of territories) and to effective changes (to action, organizational set-ups, innovative strategies and cooperation).

In this new geographical layout, design can no longer be portrayed using the uniqueness, individuality, exclusivity (brands, design firms, made-in).

New territories of Design as expression of the Eco-pathy concept, which must be based around development and networks, with values, know-how and talent driving them. The proximity (employing the model of virtual communities) must be now cognitive rather than physical, but without losing (or better without ignore) the actual skills of each singular player.

In fact, if the myth of knowledge economy has moved the focus from the technical capabilities of companies to the intangible skills of society, at the same time it has generated a deeply condition of futility. Of course, a futility which is not the simply contrary of utility, but which is linked to the

Deleuzian metaphor of research: a research which advances in multiples, with no clearly-defined entrance or exit points and without any internal hierarchy (Deleuze, 1980).

Instead, pass from eco-nomy (both if it is an old economy or a new economy) to eco-pathy, means to re-focus each action to tangible aims, connecting together the real skills of people, valorising them not individually but as relational community, morphogenetic systems, experiential territory. Maybe, very close to what Richard Sennet described in his 'Craftsman' (2008) recognizing in the manual activities (therefore those tangible activities of human being) the base for a new idea of social, economic and cultural structure.

ACNOWLEGMENT

The TOOTable project has been developed by Sapienza Design Factory. The author is the Scientific Coordinator of the Sapienza Design Factory. The Research Leader of TOOTable project is Manuel Beretta. At the moment, the start-up of TOOTable project has been concluded. The next steps will be the official launch of the website and the organization of the promotional campaign on Web.

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INTEGRATE TO INNOVATE – REORGANIZING FOR SUCCESSFUL NEW PRODUCT DEVELOPMENT

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The paper reports on a joint industry-academia project, aiming at integrating functions involved in New Product Development (NPD) for a faster and more effective commercialization of innovation. The project is currently in the testing stage, so the authors are reporting on the analysis and model proposal stages of it. The major purpose of this paper is to emphasise how theory can be translated into practice and what challenges arise from such processes.

Keywords: integration of functions, new product development

INTRODUCTION

The need for effective functional integration within New Product Development (NPD) processes has been widely recognized in modern business environments due to ever changing requirements of fast growing markets. Despite extensive publications in this area, very few companies have actually succeeded in achieving the optimum levels of such integration. That is particularly noticeable in established technology companies that are involved in business-to-business (B2B) relationships with their stakeholders. In such companies the gap between functions, such as R&D and marketing has proven still to be very significant. As Barczak et al. (2009) have found in their PDMA best practices study the practice of how NPD teams are assembled, trained, enabled, supported and managed in practice is not consistent with recommendations from published research on topics such as R&D-marketing interface and NPD team performance. Furthermore, they note that "additional research on developing effective NPD strategies and on integrating NPD strategy across levels of the organizations would be useful, with potentially powerful outcomes" (Barczak et al., 2009).

This issue has been recognized by Howden Compressors Ltd. (HCL), a UK based technology manufacturing company. The company has been investing heavily in NPD over the past years, and has recognized the importance of an effective functional interface. For the purposes of developing and implementing such an interface in HCL, the company has established a close partnership with City University London. This paper elaborates on the collaboration between the company and the university on minimizing the functional integration gap for successful commercialization of NPD projects and new products and presents the preliminary findings of the joint project.

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PROJECT BACKGROUND AND RESEARCH METHODOLOGY

HCL have heavily invested in R&D over the past years and has planned to bring to the market over £4m worth of product and software development which has already had budget approval in the coming years. When the R&D department was officially started in 2008, there was no best practice or proven experience in commercialisation/marketing for new R&D within the HCL business. HCL therefore entered into a Collaboration Agreement with City University to provide a resource to help the development of an efficient internal process for the successful and sustainable commercialisation of HCL's NPD. The objectives of the joint project were identified as:

- To analyze company's current state through document analysis and discussions with relevant personnel in order to understand the perceived, actual and desired purpose and need for R&D-marketing integration across the two functions and within the business
- To identify the cross-functional gap and the mechanisms to optimize the levels of integration
- To develop and implement a model of R&D-marketing integration in order to achieve effective commercialization of new products.
- To ensure short-term and long-term profit for company in terms of tangible and intangible assets
- To formalize and effectively manage the business change brought about by this project.

A multi-disciplinary approach has been applied for successful execution of the project. A research methodology that combines tools of both qualitative and quantitative research is being used. The combination of these techniques enables examination of evidence, matching the empirically observed events to theoretically predicted events, revision of theoretical prepositions, and examination of the evidence once more from a new perspective.

Table 1: Sources of evidence for the project

Source of Evidence	Purpose
Documentation	To get insight into company procedures and formal R&D-marketing interface rules To determine roles relevant for R&D-marketing interface
Archival Records	To get a historical perspective on R&D-marketing interface To determine roles, events, settings relevant for R&D-marketing interface development To determine the NPD success rate
Interviews	To get insight on how relevant actors perceive the R&D-marketing interface To become familiar with practical implementations of R&D-marketing interface To determine socio-cultural gaps relevant for R&D-marketing interface To determine perceived causal inferences
Direct observations	To cross-reference the findings from documentations with events in real time To cover the context of individual events relevant for R&D-marketing cooperation
Participant-observation	To get insight into interpersonal behaviour and motives of separate departments To get insight into technical/formal operations in NPD

The research design for the project consists of 4 main phases:

- Preliminary analysis of the interface within the company
- Pilot model of the functional interface
- Integration of all functions relevant for NPD
- Reorganization and control of change.

As indicated in table 1, various sources of evidence are being used to determine the needed levels of functional integration for successful NPD.

Currently the project is in final stages of phase 3. Thus the first two phases will be discussed in depth in this paper, whereas the findings of the 3rd phase will be briefly outlined.

The baselines for the 1st phase - preliminary analysis of R&D-marketing interface in HCL - were two theoretical frameworks, adopted from the literature (Gupta et al, 1986; Song and Thieme, 2006).

- The aims of using them in the preliminary analysis were:
- To determine the size of the cross-functional integration gap in HCL
- To determine the integrative mechanisms that can be used to decrease the cross-functional integration gap in HCL.
- To determine factors which influence the integration gap in HCL.

Two interrelated research strategies were used to determine the studied parameters: questionnaire survey and interviews with key HCL personnel. The structure of both, the questionnaire and the interviews was based on well established measurements of the studied parameters (for details see Fain, 2010). Company documents served as supporting evidence gained from the quantitative and qualitative data gained in the preliminary analysis.

In phase 2 the pilot model of the HCL functional interface has been developed. On the basis of the results from phase 1, integrative mechanisms and factors which needed improvements have been determined and implemented into a model proposal. Additionally, relevant process flows in each stage of NPD have been proposed. In this stage, integrating theory and practice was of critical importance. Through the evidence from phase 1 and theoretical outline of best practice models of functional integration, a framework was adopted that is believed to be suitable for the company.

Currently the final model and proposed process flows are under managerial assessment. Through a Kaizen event, these process flows will be evaluated, verified and a pilot implementation will be carried out within a running NPD project. The implementation of the model in business as usual practice and its final structuring is anticipated for end of 2012.The final stage of the project will be a full roll out of the methodology within the company, and is expected to be done in early 2013.

SOME CURRENT RESULTS

In the preliminary analysis phase, mechanisms relevant for functional integration, such as formalization, centralization and organizational climate, were studied to get an overview of the current state in HCL. Statistical analysis with SPSS and PLS path modelling was performed on the questionnaire answers to ensure the validity of results and determine the causal relationships between studied variables.

The preliminary analysis of the functional interface in HCL showed that:

- HCL is a formalized company.
- HCL has a good organizational climate and moderate levels of centralization.
- A moderate cross-functional integration gap exists.
- The main integrative mechanisms which influence the size of the integration gap in HCL are the organizational climate and harmony.
- These two main mechanisms affect both the integration gap and the level of NPD effectiveness; however the two influences are contradictory.
- The integration gap has a direct effect on the final NPD effectiveness.

- 91, 4% of influences on the integration gap were captured by the studied integrative mechanisms.
- The existing NPD process is formalized, however both, the ideation and commercialization phase are rather loose and depend on the initiative and experience of people involved in the process.
- The relationship between the R&D and marketing functions is perceived as relatively harmonic; however a communication gap exists.

On the basis of these findings a draft model of the functional interface has been proposed for HCL (figure 1).

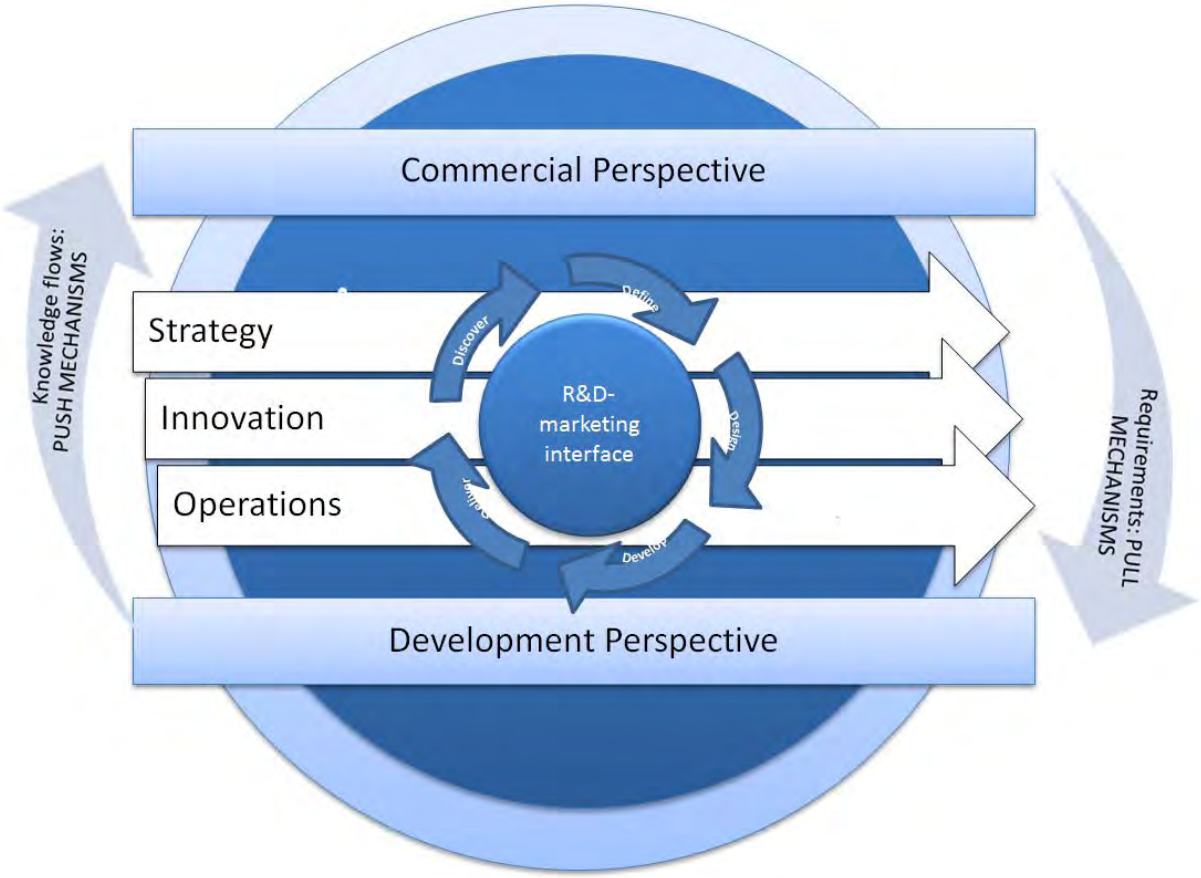

Figure 1: The NPD integration model for HCL (adopted from Phaal et al 2004)

The functional interface should support a wide range of activities from research through new product and process development, all of which should be connected to the business objectives of the company. The model represents the NPD process in 5 phases: discover, define, design, develop, and deliver. These phases in turn encompass competence and capability analysis, innovation, organizational learning and NPD management. In the framework these processes are placed within a wider business environment and linked closely to the key business processes within HCL (strategy, innovation and operations).

While the proposed HCL framework is conceptually helpful and predetermines the HCL R&D-marketing interface, it can only be meaningful if placed into tangible organizational form. Taking the specifics of HCL into focus, developing visible and credible process flows is the best way to ensure this. The baseline for this is the Howden project methodology that encompasses several stages in the run of the project. The NPD process has been structured to run in line with this methodology. For these purposes, the process flows run in 5 stages, each followed by a gateway, where a decision is made whether to proceed or stop (figure 2).

Adopting such an approach towards functional integration goes hand in hand with the research results that gave indications that formal procedures, rules and standards are desirable in the eyes of the employees of HCL. The employees namely have a strong belief that formal processes enable NPD success.

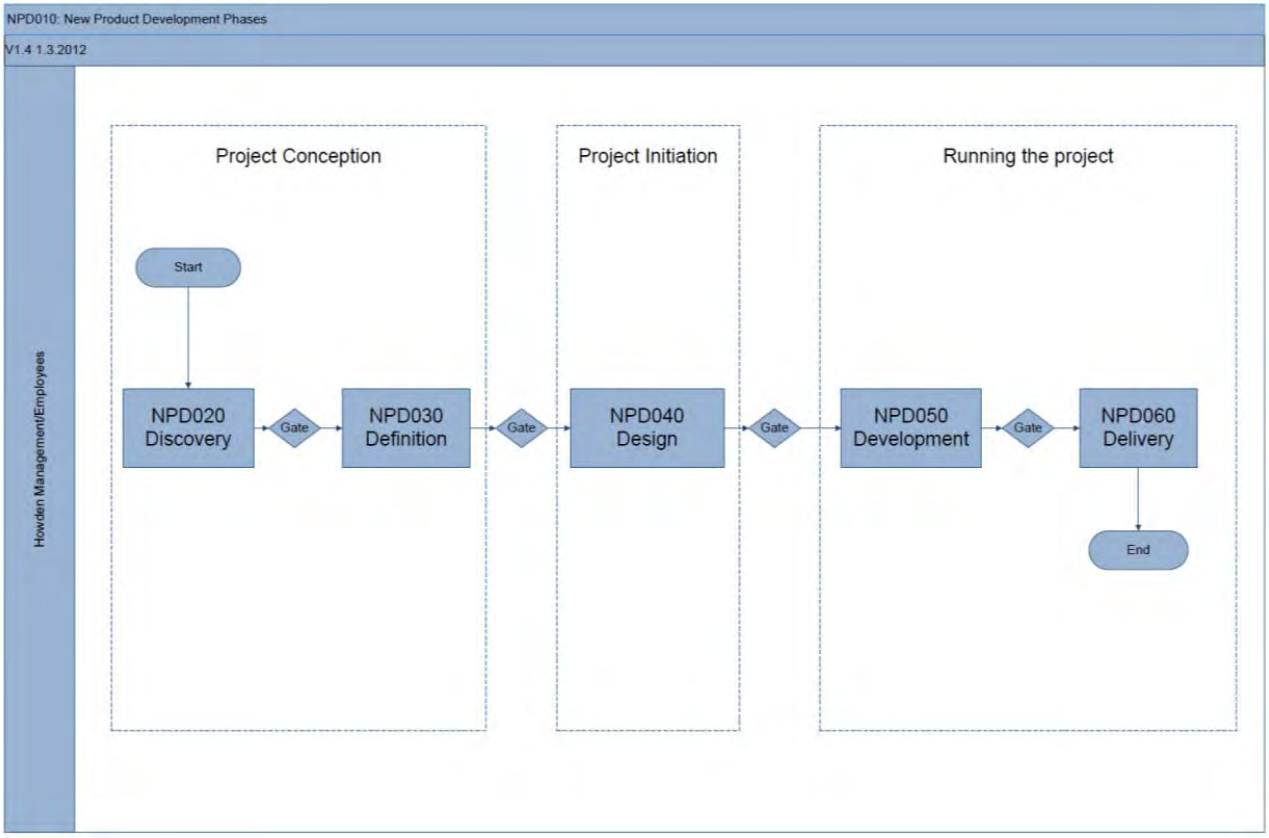

Figure 2: The HCL NPD process flows

Each of the 5 stages has activities determined that need to be performed in order for the stage to finish, along with the responsible roles within the company that take the ownership over the activities (an example is shown in figure 3).

A technical-commercial interface is introduced as a decision making body within each stage, for two main purposes:

To introduce a cross-functional team of engineers, sales, marketing and manufacturing managers that will lead NPD – this ensures visibility of where the project is in a certain time and exploits the strengths of the various disciplines of the team. They interface also ensures the breakdown of the "functional silos" that exist in high-tech manufacturing organizations.

To redistribute the decision making process within the company and thus make people accountable for parts of the decisions within NPD – this gives people ownership of activities and ensures they are committed to the execution of the process.

As the company has been introducing lean into the business as usual (including R&D), the R&D-marketing integration project is adopting the approach to (re)develop the NPD process accordingly. Lean is defined as the perfection pursuing by the elimination of waste, coupled with the insertion of practices that contribute to cost reduction and schedule while improving performance of products, processes and organization as a whole (Wang et al, 2011). As categorized by Womack et al. (1990), the main steps of lean are: (1) define the value; (2) identify the value stream; (3) flow the product; (4) pull; and (5) strive for perfection.

Through the first two stages of the project it has been identified that R&D and consequently new product development is an integral part of business development in HCL and a structured process has been identified. The implementation stage that follows will focus on the “pull” and “strive towards perfection” aspects of lean to enable a faster time to market and better competitive advantages for the company through NPD.

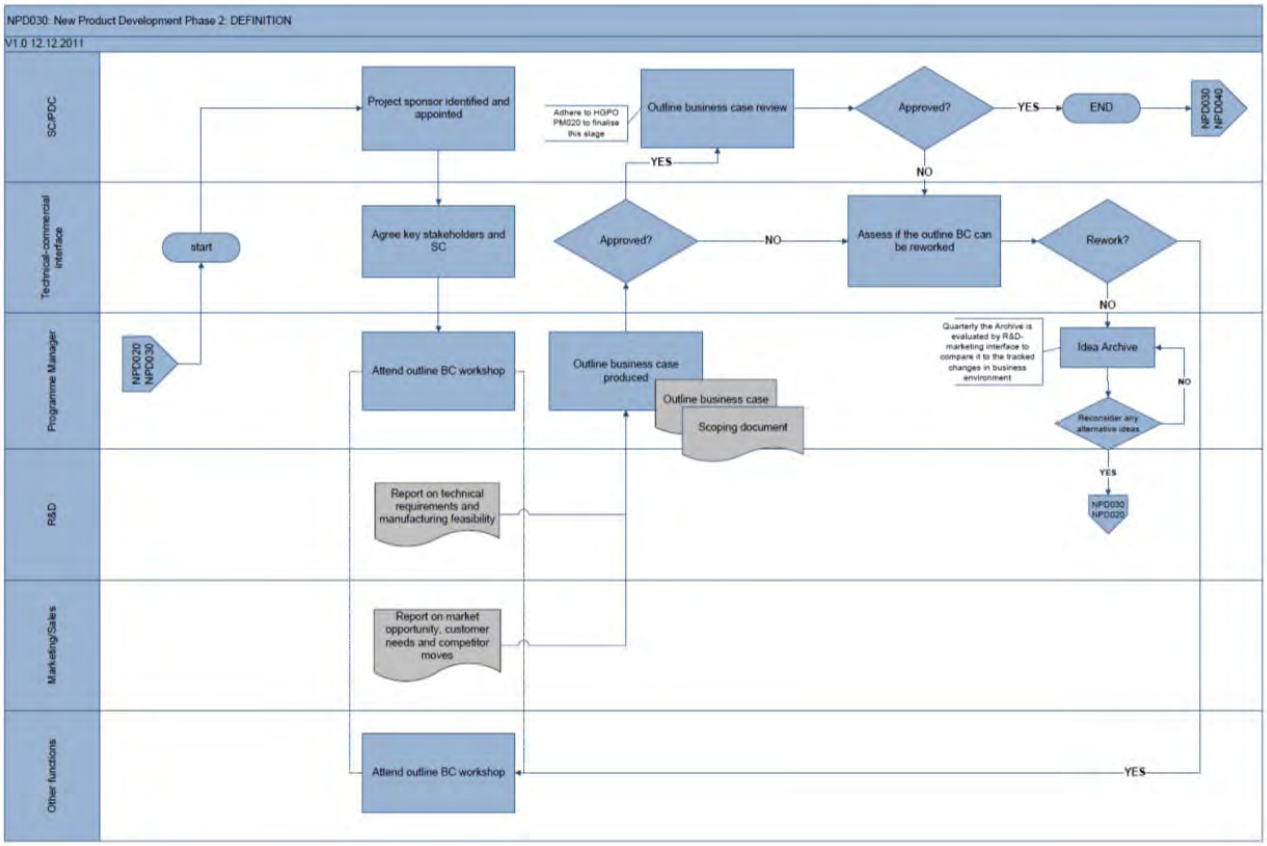

Figure 3: The definition stage of NPD process – example of activities and roles

APPROACHING IMPLEMENTATION

For verification and implementation of the proposed processes into HCL NPD the managerial sign off is in the process. To align the project with the company vision of continuous improvement, this will be done through a Kaizen event, which constitutes parts of lean management within the company. A Kaizen event is a ‘‘focused and structured improvement project, using a dedicated cross-functional team to improve a targeted work area, with specific goals, in an accelerated time frame’’ (Farris et al., 2008,p.10). In addition to a variety of technical system improvements, practitioners also report significant social system improvements from Kaizen events (i.e. Melnyk et al.,1998; McNichols et al.,1999). Kaizen events are one way organizations seek to implement the broader concept of kaizen (Brunet and New,2003), by introducing the concept of continuous improvement techniques and the development of an organizational culture that supports continuous improvement in the long-term (Glover et al, 2011).

A highly focused, action oriented 3 day improvement workshop is scheduled to be held at the HCL company to proceed to the final project stages. Kaizen is process-oriented, i.e. before results can be improved, processes must be improved, as opposed to result-orientation where outcomes are all that counts (Imai, 1986, p. 16-17). Kaizen does not state that results are of minor importance, but rather that management attention should be directed towards creating sound processes since it is assumed that good results will follow automatically (Berger 1997).

Although academic research has provided mixed evidence on Kaizen event success and post-implementation follow up (i.e. Glover et al, 2011), HCL has had a dedicated team for lean implementation, that has held several Kaizen events already, tangibly improving the way the company operates. Taking all relevant factors, influencing successful lean implementation and continuous improvement into account, this team has built up an atmosphere and attitude within the company that has made the employees committed to Kaizen, thus giving a favourable environment for successful execution of here presented project. A follow up on the success of the event will be reported by the authors in further publications on the topic.

IMPLICATIONS FOR THEORY AND PRACTICE

Pioneering work the field of functional integration in NPD has been done by Gupta et al [1986], who provided a theoretical framework for studying the R&D-marketing integration levels. Their work has its origins in strategy-structure-environment paradigms of organisational design, the organisational context of innovation, and the social differences between marketing managers and technical specialists.

This work is the most widely cited in the field, but has yet to be subjected to holistic empirical test as it failed to address specifics of the environment in which the company operates, especially the cultural aspects of company's origin.

Early studies such as those of Ruekert and Walker (1987) and Song and Perry (1993), identified integration factors important in different stages of NPD and linked the cross functional integration to NPD success. Furthermore, some studies actually determined in which areas of NPD a specific function needs to be more involved, and where the cooperation/integration of R&D and marketing is most needed, for example Olson et al (1995). An integrated literature review on the topic has also been provided by Griffin and Houser (1996), but has not been updated recently; therefore there is still a need to consider the trends developing in the 21st century such as globalization, IT technologies, NPD in virtual environments, recent recession and others.

The studies mentioned here provide validating evidence of the majority of factors relevant in functional integration but treat them as separate issues. Therefore an integrated holistic approach is needed. Furthermore, available studies do not provide explanations of possible practical implementations, and are not giving support to real-life companies in establishing an effective functional interface in NPD.

This paper outlines the process of a joint industry-academia project that has been started to enable faster transfer of initial new product ideas to the market in a form of a profitable product for the partner company. The project is based on scientific research and practical application of the findings into the company and takes all the relevant issues mentioned into account. When finished, the project results will not only serve the company involved, but will enable further scientific generalisations on the topic. This will upgrade the state of the art in the field and give other companies the possibilities to implement the proposed interfaces in their environments.

CONCLUSIONS

This paper outlines the process of a joint industry-academia project which was initiated in order to enable faster transfer of initial new product ideas to the market in the form of a profitable product for the partner company. This project is based on scientific research and practical application of the findings into the company. Its two main objectives are to implement changes in the NPD process in the company with the goal of effective commercialisation, and to generalise findings of this project and test the effectiveness of such activities with the aim to encourage growth of the UK economy.

The developed NPD process flows are not completely new for this company. They combine elements of the effective practices in existing R&D projects with the best practice and theory of general NPD found in literature and through experience of the main key actors in the company’s NPD. It is important to note that theoretical implications gained from R&D-marketing integration

literature review provided a useful tool for the initial analysis of state as is within HCL, but additional characteristics related to the experience and maturity of the organization and its use of lean management tools, such as Kaizen events also needed to be considered in modelling the NPD processes for this case study company. This is an important challenge that academic researchers face when dealing with real life projects, involving a specific business environment and company culture. One of the outcomes that is anticipated after the end of this project is a set of data relevant for such project, thus a more general framework will be determined through additional case studies beyond the life span of the described project, to contribute to the state of the art within the fieild.

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BUSINESS MODEL INNOVATION AND DESIGN THINKING: A CASE STUDY OF DELOITTE DIGITAL

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The imperative to innovate has never been stronger given current global volatility. Even more so, firms in mature markets with diminishing margins have to find new and novel ways to both sustain current activities and grow business that will become the core business of tomorrow. This paper presents a case study of a design led approach in driving product/service innovation in a conservative professional services company that largely sells time. Through design thinking, Deloitte Digital has re-orientated its business model from a 'straight to solution' approach to one that focuses on delivering an 'And Different' customer experience. Whilst still early days, it is clear design thinking has become an effective means in democratizing innovation, and moreover a key catalyst in linking strategy to action.

Keywords: Innovation; design thinking; business models

INTRODUCTION

When Giam Swiegers assumed the leadership mantle of the professional services firm, Deloitte Touche Tohmatsu Australia (Deloitte) in 2003, he quickly realized the daunting task ahead of him with the company's fortunes seemingly in free-fall. Deloitte, in a newspaper article was referred to as the 'sick puppy' of the 'big four', tier one professional services firms. It trailed significantly behind PwC, KPMG and Ernst & Young, and was at imminent risk of losing its status among the big four, relegated to the unconscionable position of becoming a tier two player. As Swiegers discovered, the company was hemorrhaging clients, staff and millions of dollars of revenue. In all it was a bleak and somber work environment, lacking in direction, motivation, and low in collective esteem. The challenge was how to turn around the company's fortunes and build a different future.

Innovation became the key to growth and Swieger's new vision declared that the firm would be 'Number Two and Different', later revised to just 'And Different'. Swiegers and his senior executive were relentless in learning how to 'do' innovation, researching extensively, seeking the advice of experts, as well as exposing and educating key change agents and partners to this new, unfamiliar world. For a firm inculcated in the norms of the traditional professional services model, this was uncharted territory. Nevertheless, this risky but decisive new strategy based on instilling a culture of innovation has brought dividends, lifting Deloitte Australia to number two amongst the big four with an accelerated growth rate the benchmark of the sector. A key component of the strategy has been Deloitte Digital, a spun-in business unit driven by the imperative to innovate in the digital arena and an unconventionally designed business model. This article explores the innovation

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journey from Digital's inception to recent embracement of design thinking based on in-depth interviews with stakeholders throughout Deloitte, as well as through data collected during an ethnographic study.

This case employed a life-course model to guide an ethnographic analysis of Deloitte Digital. The life-course model utilizes the core principles of growth and development, and is embedded in the proposition that every organizational life cycle begins with birth, explodes into growth, transits to maturity, sinks into decline, and ends with death. This life cycle model has become a useful mannequin for displaying the cumulative learning, identity building, values creation, and social behavior that takes place throughout an organization's lifetime. The life-course model also proposes that one way of understanding an organization's current behavior and practices is to explore past behaviors and practices. It is axiomatic that a life course begins at birth, transitions through various stages of growth and decline, and ends with death. In between, though, interesting, challenging, memorable, traumatic, and game-changing events occur. An organization's life journey rarely proceeds in a linear direction, nor is the result of one neatly planned step after another.

A life course model provides for the interweaving of 'age-graded trajectories', which include a pattern of concurrent pathways linked to developmental factors, with 'short-term transitions', which reflect more immediate environmental concerns (Elder, 1994, p.5). Transitioning is not always smooth and trauma-free since it often involves a change in roles, responsibilities, and organizational identities that involves "a change in one's behavior and relationships" (Schlossberg, 1981, p.5). Life course models also give weight to the ways in which early organizational transitions shape later experiences, events, and ultimately, trajectories (Leonard & Burns, 2006). This feeds into a deeper layer of the life course model related to critical incidents and events inducing change. These critical incidents and events— 'turning points'—provide an additional catalyst for transitions. Turning points have the capacity to radically change trajectories by either offering new choices, or severely denying opportunities. Moreover, they not only produce positive transitions, but also induce negative transitions (Yair, 2009). Turning points also tie together three elements of the life course model: (1) a prior steady state, (2) a critical event, and (3) the plotting of a new trajectory (Yair, 2009, p. 353). A number of life-course models have been applied to the analysis of organizational development, here, we favor the pathway approach where organizational life events and environments are used to explain experiences, opportunities, and decision-making in order to establish the present 'life trajectory' of an organization.

The case study employed in-depth interviews with a census of Deloitte Digital's members as well as the Senior Executive of Deloitte Australia, and a purposive sample of partners across the firm who interact with Deloitte Digital. In total 32 interviews were conducted, transcribed and coded. In addition, ethnographic data were collected through immersion in the organization via a series of participant observations undertaken over several weeks. Observations were recorded as transcribed notes and added to the interview data for coding. As a result, significant links, relationships and themes common throughout each of the codes were identified (Riessman, 2008) and the life-course constructed. We have introduced the critical events facing Deloitte, their initial steps toward growth through innovation and the strategizing around 'new trajectories' in particular two issues; firstly, the executive's will to learn from acknowledged experts and secondly, the vision in supporting the establishment of Deloitte Digital led by Peter Williams. We continue next by examining critical moments in Deloitte Digital's lifecycle from establishment to more recently, engagement with design thinking in commercializing new products and services. Interwoven throughout the case are vignettes highlighting specific aspects of the journey as described by the central stakeholders.

Giam Swiegers (CEO)

"My inspiration was survival ... this was not a time for the faint-hearted."

According to Swiegers, the potential for innovation takes its lead from the deep, cultural messages embedded in a firm. He observed: "… when you put forward a new idea the winner is normally the guy that can kill it the fastest. You know, we are hardwired to be skeptics, every bit of training, everything that we do is to be skeptical and now we're saying hang on, have an open-mind … you had to give an idea a chance and say what if ... how could we make it work? And, we spent a lot of time with that as a concept, which sounds simple, very hard in an organization like this to do and very, very hard to implement."

When Deloitte first launched its innovation program in 2004/5, Swiegers declared that anyone who joined the firm would have the "right to innovate." By 2008, in the midst of the global economic crisis, Swiegers called for a shift, "from you have a right to innovate, to you have a *responsibility* to innovate."

Deloitte Digital evolved from the innovation program introduced in 2004/5 as a tangible exemplification of thinking differently about meeting the innovation mandate. It began with the premise that the future of professional services would involve a significant shift towards digital delivery. While a strong assumption, it also "… missed one vital thing and that is that because we're an audit firm we have audit independence issues, which means client acceptance is far more complex than for any online business." Clients from the mainstream service lines like audit and tax were unlikely to seek an automated service. In response, Deloitte Digital found ways to package new products with old services as well as new digital services to supplement existing ones. The transition has recently led to the consolidation of all online and digital activities at Deloitte. With Deloitte Digital consolidating with Deloitte Online, the group now operates with a decisive competitive advantage in high growth areas such as mobile devices and applications.

To Swiegers, the key lies in the link between the design behind the product and service offerings and a keen understanding of business strategy: "... a lot of the people that design the stuff don't understand business strategy the way we do, we can work with a client and say there's your whole strategy, that's how you want to get the efficiency out, this is how you should do it and by the way we can do it and that's working way better than I ever thought it was possible. I think our online team this year has grown by 48%, it's just really unbelievable that it could grow that fast; and very, very profitable."

AND DIFFERENT

One of the ground breaking experiences for Swiegers and his senior executive team as they searched for ways to create the conditions for innovation and build the 'And Different' mindset was a course they all attended at Harvard. It focused on leading change and organizational renewal (LCOR), delivered by Michael Tushman and Charles O'Reilly. The LCOR course introduced Deloitte's executive to the concepts of ambidextrous organizations and 'explore-exploit'. From a theoretical perspective, Smith and Tushman (2005: 523) defined exploitation as 'variance decreasing' based on 'disciplined problem solving' and exploration as 'variance increasing' through trial and error experimentation. Consequently exploitation is concerned with stability and continuity; it draws on and builds from an organization's past, aiming to increase efficiency and profitability of the current business model. Exploration on the other hand is concerned with change and adaptability; encouraging creativity and risk-taking, and tapping into new, untested markets and opportunities (Groysberg & Lee, 2009; Smith & Tushman, 2005). In short, the key to success in the fiercely competitive global business arena lies in finding ways to innovate and commercialize at the same time.

Swiegers and his executive team recognized that exploring new opportunities while simultaneously exploiting existing capabilities—a mode of thinking also advocated by O'Reilly and Tushman (2004)—required quite different modes of strategizing and organizing. It presented a deep challenge to the engrained culture of a "died in the wool" professional services company.

However, Swiegers and his executive also accepted the importance of the strategy in regenerating Deloitte Australia and achieving 'Number 2 and Different' in the highly competitive and mature professional services industry. According to Lewin, Long and Carroll (1999: 540), those firms most likely to survive periods of high uncertainty and turbulence, evolving into new forms "have developed and nurtured a balance of exploitation and exploration capabilities."

But how feasible is it, and what costs must be borne, in aggressively pursuing high levels of both exploitation and exploration? How, for example, do organizational leaders accommodate the tensions that accompany a commitment to innovation through both exploitation ('tight' structures, control, continuity, stability, conventional reporting and performance measures) and exploration ('loose' structures, flexible, responsive, experimental, evolving)? Simply put, *how* can organization leaders like Swiegers deal with such contradictory and complex forces? After all, according to previous studies, high doses of exploration and exploitation at the same time means dealing with completely different structures in a business as "mutually enabling constituent" parts (Farjoun, 2010: 205). Moreover, professional services firms "are not generally equipped to cope with fragmentation and high ambiguity" (Seo, Putnam & Bartunek, 2004: 162). For the most part, their core business resides with a long-standing, conservative and legalistic business model based on compliance, trust, security and efficiency.

Gerhard Vorster (Chief Strategy Officer)

"… with two little words, we're just never satisfied."

Deloitte's Chief Strategy Officer is also its innovation architect. Gerhard Vorster assumes responsibility for delivering on the firm's target of 30% of its revenue from new or substantially different service offerings every two years. As a billion dollar revenue company, Vorster has delivered on an immense challenge: generating more than $300 million of new business services every two years. He says that the target has two effects: "It replaces the stuff that becomes redundant and commoditized that we need to exit, but it also creates growth opportunities which our people need like humans need oxygen. You lose talent if they don't see growth, so that was just very, very important for us. Now, this 30% new or substantially different became a core element which was driving everything."

A second platform in Vorster's implementation strategy was to recognize the cultural effects of being directive about innovation. Shifting away from the natural inclination to prescribe and inform—the 'how' of the process—the firm began to focus its innovation communications around 'why'. Vorster commented, "In every state of the nation we do, in every training course we do, we did away with trying to take them through a tutorial on how to play the innovation zone; we were talking about what new services means … how it creates opportunities for growth for individuals, how many people actually make partners out of that, how this is cool to be in the new space, and all of our conversations we gauged them on was why, why, why, why innovate?"

Leading on from the intention-driven communications, Deloitte introduced a third element in their innovation design that is currently driven by design thinking focused on democratizing the innovation process through idea forums and a micro-funding program led by Deloitte Digital. According to Vorster:

" … if you look at explore-exploit, the exploit process said you put a business case in place with certain workflow, this is what you do, this is the approvals you get, get it signed over 10 places, it comes to the innovation or investment and growth committee, we will put some parameters to it and you go … we've said no. Micro-fund is you come up with a good idea; you get $10,000 to go and play with, no questions asked. You just go and play with that. What we want you to do is you have to use it in three months, you know, otherwise you're not serious about your idea, otherwise you lose it, and we don't want you to add more features to it. We want you to go and play in the market, see what clients are telling us on that and then come back to us, and if it's a good idea we will go into a more formal capital allocation process. What this did, we had 52 micro-funds taken up in the first

year. I think 21 of them resulted into products. Those products are now generating hundreds of millions of dollars for us as we start to see them coming through into a rapid scaling up now. But the beauty of this is you give a person $10,000, they spend their weekends on this. You get $50,000 worth of input for that investment. That was the best return on investment we ever got because we tapped into discretionary effort, and people didn't feel abused. They loved it, and that now is core to the way that we look at our innovation program."

DESIGNING FOR INNOVATION: EVOLUTION AND REVOLUTION

As early as 2004, an internal innovation program was established, designed to provide Deloitte employees with a forum to share and generate ideas. This was a formal program with a governance model, comprising an appointed executive under which an Innovation Council was established to assess ideas, of which there was no shortage. Many of the ideas put to the Innovation Council concerned replacing traditional face-to-face delivery of client services with digital service delivery. These demonstrated how traditional service media could be delivered more effectively, cheaply and at a higher quality online. Another common theme involved adding an online component to a traditional client service that would offer a better end-to-end solution. The concept for Deloitte Digital was spawned in the confluence of these early initiatives for online service delivery.

Deloitte Digital was established formally in 2010 with the mandate of delivering professional services via an online portal in order to provide easy access to a range of financial tools, online training, compliance, and human resources solutions. Specific examples include accounting, benchmarking, education around innovation and leadership, identity verification for the banking sector (e.g. for 100-point checks), and social media services. The online accounting services illustrates the shift from the traditional compliance mindset to business adviser, as both accountant and client can access real time data, possibly sitting online in different geographic locations, and where the different data sets are automatically synchronized and updated, creating a hypothesized "world of joy" for the accountants.

Deloitte Digital evolved rapidly using a technology-service-product hybrid underpinned by a competitive model emphasizing a morphing of design thinking approaches adopted by Deloitte as a result of interaction with experts such as Roberto Verganti and his work on 'design-driven innovation', Michael Barry and Sara Beckman's framework of design thinking as a learning process, Roger Martin and his 'Knowledge Funnel' and Tim Brown's work on 'Change by Design'. According to Gerhard Vorster, the aim was "not to create another hard to remember and actually useless process", instead Deloitte's aim was to operationalize its growth strategy based on innovation and differentiation through design thinking's potential to build and develop innovation capability across the organization. This approach sees design iteration starting in the concrete and analytical mind set by looking at what does not work, then taking this into the abstract and starting to reframe the problem, analysing what the reframing tells you then synthesis through defining options; culminating in convergence around interpretations that can then be made real. Critically, the approach advocates that design thinking is fundamentally about human needs. The iteration for example translates into five imperatives: "make me care", "show me something new", "tell me what's missing", "what can be changed", "make it tangible". This is achieved through rapid prototyping, proof of concept via client collaboration, fast and cheap failure, accelerated scale and an agile innovation pipeline system. The small, spin-in innovation engine that became Deloitte Digital prospered using a unique combination of two offerings. First, a consulting model focusing on the internet, intranet and multi-channel strategy, customer experience design, social media strategy, mobile applications development, and digital technology architecture and implementation; and second, stand-alone technology products to supplement existing services or stimulate new consulting opportunities. Embedded in Deloitte Digital's rise to prominence, design thinking has become the link between a bespoke innovation pipeline program and the 'And Different' strategy. This has taken some vision and according to Gerhard Vorster, Deloitte Digital's CEO "Peter

Williams has always been a voice in the space, still is a voice in the space, has always been the advocate that was pushing the boundaries that contributed a lot to the positioning that we just had in general in the marketplace, just the profile that a guy like he had."

For Pete Williams, the Deloitte Digital vision was to be "breathtaking in execution". With digitization a core part of the future for professional services firms, Deloitte Digital aimed to be a "game changer" and global pioneer in online professional services delivery. Deloitte Digital therefore turns the traditional professional services firm model on its head. While the latter works on a low quantity of clients, very high touch, regular face-to-face client contact, and high margins, the online model in contrast is low touch, low resolution, infrequent face-to-face contact, self-service, high volume of transactions, and many clients but low margins. When asked how design thinking influences Digital's drive to change what Deloitte as a whole does from providing professional services to 'designing and selling experiences', Williams drew upon Tim Brown's approach emphasizing *insight, observation and empathy* in balancing the dominant constraints of product/service innovation – *feasibility, viability and desirability.* A mind map of this inverted business model was quickly produced and is presented following.

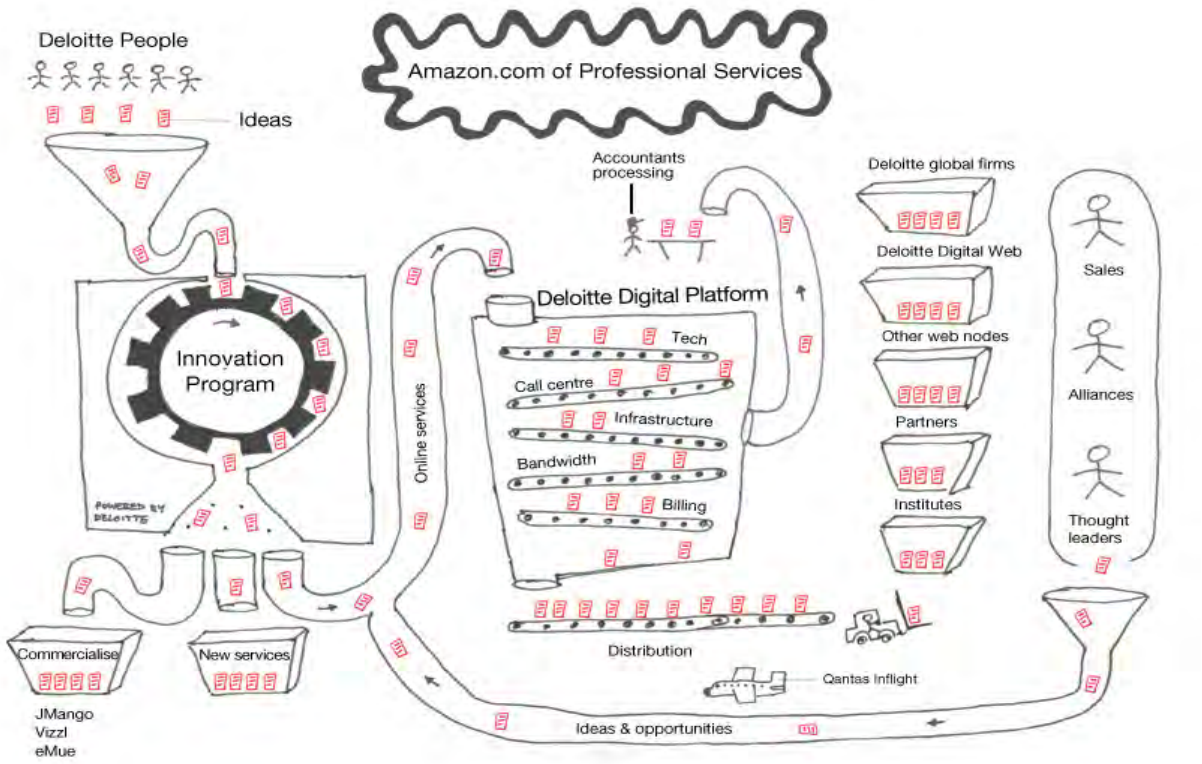

Figure 1, Deloitte Digital Business Model Mind Map

Williams describes his approach to design thinking and innovation as "probably a lot more low resolution than most." In his view, the most important aspect is not the generation of new ideas, but their convergence into rapid execution and this is where design thinking comes into play. Using the cloud-based Innovation Academy tool, Deloitte Digital solicits divergent, new ideas from anywhere in the firm and also external to the firm, typically arranged under a general theme such as social media, mobile applications, or gaming. This is combined with their small group-based Innovation Café process for collective brainstorming incorporating contributors from diverse backgrounds, expertise and positions. Typically, at an Innovation Café session between six and 10 people work at each table on separate set challenges. Sessions commence with subject matter experts

providing an overview of each challenge. A table captain on each table facilitates the conversation, takes notes and records all ideas, typically on butcher's paper. The groups brainstorm ideas for 10 minutes and then rotate to the next table where they contribute to the next challenge, building on the ideas noted by the previous group/s. In the final rotation, the groups pick one or two key ideas and present a 30 to 60 second elevator pitch to solve that challenge. The pool of new ideas is next subjected to an online game mechanic for rating on the Innovation Academy using rationed votes to help conflate the sweeping range of ideas to a handful. Williams observed, " … the effect of the process is to create, generate ideas, submit those ideas in a transparent way, open through our innovation idea capture tool, and then people promote it through our internal social media networks and through their mates and all that stuff and try and get them to vote for it, comment on it, collaborate around it." The Innovation Academy runs as a permanent program that is regularly supplemented with themes, festivals and cafés.

Ideas are reviewed every two weeks by the Innovation Council Williams chairs, which allocates micro funding to the most promising on the basis of voting and alignment with existing offerings. The micro-funding model utilizes a venture capital philosophy. Once an idea has been selected, its originator is allocated AUS$10,000 on the basis of a one-page pitch: "Put the idea in, we'll review it within two weeks, if we like it we'll give you a micro-fund of $10,000 which gives enough oxygen to the idea to get it going. We help navigate within the organization as to who the best people are to help you get that idea up and running, prototype it, test it, if there's an appetite for it, expand it." The micro-fund works on the basis of a 'pool of time' concept.

As a professional services firm, Deloitte uses time as a currency. It therefore needed a mechanism to allow its members to work on converting innovative ideas to commercial offerings in the same way that they would with client ideas. The answer involved creating a pool of time wherein a dollar value was allocated against every project. As a result, project champions could work on their ideas up to the value of AUS$10,000 without compromising their service line revenues, as the project was treated in the same manner as a client billing process. As a method of cyclical regulation when ideas flow quickly or slowly, the Council can modify the realization percentage on the pool of time. If new ideas are overflowing, for example, realization on the time can be decreased so that project champions work for less than 100% of full billing rates. Innovators can receive up to AUS$50,000 in bootstrapping finance provided their six-weekly reports demonstrate proof of concept, client interest, and ultimately a commercial case. Projects are broken into discrete chunks or 'staged gates', where exits can be taken discontinuing, divesting, spinning in, or commercializing the new product or service.

Although simple, the genius behind the pool of time model is that it protects partners' performance measures, thereby encouraging quick forays into innovation, as costs do not come in either implementation time or in preparing lengthy business cases. Underpinning the model, Williams insists on prioritizing action over planning: "So it's much more about prototyping, bringing the idea to life, socializing it, finding somebody who wants to run with it as opposed to going and plan, plan, plan, plan. And that's why I don't believe in doing business cases around innovation. I believe in doing prototypes." Studies by Brown and Eisenhardt (1997) some 15 years ago add weight to Williams' action over planning approach. They observed that successful firms balance structure and chaos, and rely on a range of low-cost experimental initiatives as forays into the future. They claimed that such paradox-consistent thinking was more effective than planning for, or reacting to, unforeseen changes. Smith and Tushman (2005) also suggested that so-called paradoxical thinking was a key enabler in the simultaneous pursuit of exploration and exploitation. Similarly, the approach taken by Williams and Digital reflects Roger Martin's *mystery-heuristic-algorithm* model of design thinking-led innovation. The initial divergent ideation followed by divergence to rule of thumb and then refinement in achieving scalability mirrors the exploration (divergence) then exploitation (convergence to simplicity from complexity) paradigm though Williams probably would not want to over analyze things - to him, innovation is not that complicated.

DESIGN THINKING 'TOOL-BOX' IN BRIDGING EXPLORE-EXPLOIT

Tim Brown observed there is no linear step-by-step approach to design thinking, instead an interaction of three spaces, *inspiration, ideation and implementation.* Brown argues that design tools developed and used by designers can be effectively utilized in business. He identifies user-centered understanding via ethnographic investigation; brainstorming; mind mapping/visual thinking; storyboards, improvisations and scenarios; and rapid prototyping as effective tools in making ideas tangible. Roger Martin also identifies similar tools as facilitating an organization's ability to capture inspiration that is found at the extremes, the edges of unfamiliarity where inter-disciplinary creativity and experimentation in collaboration with a diverse set of actors in the innovation ecosystem can build an organization's capacity to think analytically, intuitively and abductively without prejudicing one over the other. Deloitte Digital in its relatively short life has through experimentation with, then systematic adoption of, design thinking tools reached a critical moment in its life course where a new trajectory begins.

Deloitte Digital's role as an online professional services provider has rapidly evolved with two distinctive operational arms emerging. One is focused on exploring new technologies, new frontiers, and continuous prototyping as championed by CEO Pete Williams. The other is focused on exploiting products and services, currently offered online to internal and external clients, which have evolved through the innovation process either within Deloitte Digital or other parts of the firm (e.g. Tax, Risk). The exploit arm is led by Tom Richardson, Managing Partner, Deloitte Leadership Academy, which operates within Deloitte Digital. Other 'exploit' products within Deloitte Digital include DTermine™, an online survey and benchmarking platform, the Whistleblower Service, and the Client Services Desk. DTermine™ began as a fraud-based survey offered to internal (70%) and external (30%) service line clients. It now runs surveys in a diverse range of areas including risk, human capital, and forensics for both private corporations and government agencies. From 2010 to 2011, for example, it undertook 500 surveys, including event feedback surveys, a survey on the use of olive oil, and anti-bribery/corruption surveys. DTermine™ also annually processes all the exit interview surveys for a number of organizations including the Commonwealth Bank of Australia (CBA), which has between 6000 to 9000 leavers per year. The DTermine™ exit survey tool was the only one on the market to pass the CBA's stringent security test.

Whistleblower is an anonymous and independent employee hotline and email service. It was initially part of the Fraud business unit but has evolved from a fraud preventative tool to a corporate governance tool. Its responsibilities include occupational health and safety, environmental issues, corporate social responsibility, human resources, and human capital. It also offers phone, email, web, and third party service. For Whistleblower Manager, Ralph Steadly, a key focus has been to develop efficiency and quality of delivery. Whistleblower has 60 to 65 clients, comprising 30% of the top ASX, with the balance in the top ASX 200 and SMEs.

The Client Services Desk, a key exploit service is also located in Deloitte Digital. It is the first point of contact for the Whistleblower service and provides support to calls coming in for Bamboo. Bamboo is a business continuity mobile phone application that ensures an organization's disaster plan is delivered to employees' phones in case of disaster to person or property. Bamboo is also a good example of a product supported by Deloitte Digital, but originally developed by a service line. Although Deloitte Digital was heavily involved in its development, it is still operated by the Risk Services Line because they use it with their clients. The Service Desk comprises seven team members under Peter Vien, Service Desk Manager since mid-2008. It provides technical support covering every product and support line (1800) and support email address. The desk further comprises an on-call model for people who work night shifts. Team members have four weeks training before they are allowed on the phones, which include training in cognitive interview processing in order to manage a diverse range of callers from CEOs to cleaners. A call management system is employed which deploys an intelligent knowledge system, directing action

and recording events. Team members must record key identifying information and compile a formal report.

A Social Media service also resides in Deloitte Digital. Deloitte CEO Swiegers described social media services as “complex, fast changing and full of risks” as it has to manage a delicate balance between a traditional consulting approach and the digitized services around it. In this respect, the Social Media service represents an explore/exploit hybrid offering social media diagnostics, SWOT analyses, and a social media-monitoring platform. A key focus lies with educating clients on how to use social media effectively and turn data into social media strategy. It is also involved in DTermine surveys, and constitutes part of the Innovation Academy learning diagnostic.

The embracing and further development of design thinking tools and approaches (e.g. in the use of gamification) have enabled Deloitte Digital to create and implement a fuzzy boundary between explore and exploit accelerating the conversion of product/service of tomorrow to revenue stream of today. Deloitte Digital’s methods for leveraging the explore-exploit tension bring to the fore many of the constraining issues that innovation theorists such as Baghai, Everingham and White (2000), and Moore (2007), have highlighted. Such constraints appear when organizations attempt to calibrate strategy and operational systems around an (imperfect) ‘optimization’ of exploitation-exploration. Simply balancing the two out in equal but modest amount does not work with resource cannibalization the usual result. It is not so easy for companies to pour considerable resources into both ends of the funnel at the same time. Moreover, resource migration rarely occurs from exploit to explore, particularly given the variance in cycle times. Managing in the exploit domain dictates that systems and processes are geared around budgeting and reporting over a fiscal year (particularly so if shareholder wealth-building is the primary focus of an organization). This is predicated upon the almost unassailable conventional notion that core business is to a large extent predictable and thus efficiency gains can be achieved through well-designed systems and processes. Very few managers are comfortable with uncertainty and ambiguity, especially when it threatens profit margins and performance bonuses, and are consequently reluctant to adapt and improvise. Equally, commercializing creativity in the explore domain demands alternative metrics and priorities around time horizons, performance, and investment outcomes. To attempt to sustain such a balancing act requires management and organizational buy-in of the highest order, as well as no small measure of skill. Part of the trick Deloitte Digital seems to have mastered in dealing with the explore-exploit tension revolves around maintaining a deliberate disequilibrium that recognizes the opportunities at the edges but also understands the need to incrementally innovate at the core.

CONCLUDING COMMENTS

Reflecting on the Deloitte Digital innovation story, it becomes clear that collaboration and synergistic activities are a large part of their success, yet to achieve this, there needs to be both cultural normalization around these key success factors and ways and means of driving this. Through leaders that were game enough to say ‘we don’t have the solutions’ but who were willing to listen, adapt and learn, a culture of innovation has become the norm in Deloitte Digital and wider afield across Deloitte Australia. Yet more is required than leaders showing the way (important as that is); new ways of thinking are required as well as tools to enable ideas and creativity to be crystallized. This is where design thinking has become a powerful force for Deloitte; the mind-set of Deloitte has been fundamentally altered from ‘we know the solution’ to one of empathy and engagement with clients in designing and delivering experiences that set Deloitte’s services apart from the rest. As the Deloitte story shows innovation can occur within a context of rigid structures that require accountability and due process. Other innovation and change cases like ours similarly reveal that growing forms rely on an interactive mix of continuity (exploitation) and change (exploration) (Leana & Barry, 2000; Luscher & Lewis, 2008; Davis, Eisenhardt & Bingham, 2009). As boundaries blur and organizations operate deeper in global markets, ‘loose-tight’ relationships become more important, where structures are needed to enhance responsiveness whilst bolstering

efficiency. In short, as we have described in this case, freedom needs boundaries while boundaries need spanning.

As Deloitte's leadership recognized from the outset, opportunities for innovation cannot be at the expense of control. A solid foundation of stability serves as "both an outcome and medium of change" (Farjoun, 2010: 203). It provides the solid base from which explorative, innovative ventures, critical for renewal and longevity, can proceed. The challenge, as Deloitte's initiatives through its digital arm highlight, is determining how to excel at both, simultaneously maximizing performance efficiencies whilst creating an adaptive, responsive, innovation-driven culture. Design thinking affords Deloitte the means to change thinking and to guide and direct action in delivering better customer experiences and likewise in fostering the desired 'And Different' mind-set. As a professional services firm, Deloitte operates a business model with a low quantity of clients, high touch services, significant face-to-face contact, and high margins. Deloitte Digital turns this business model upside down using low touch services, remote connections, self-service clients, and a high volume of transactions and clients, all within low margins. Added to this reversed model, Deloitte Digital introduced new technology-driven products into their offerings. Not only did products become core business in a services firm, their incorporation led to unexpected new consulting services for other, more traditional, parts of the firm and ultimately superior customer experiences. In combination, Deloitte Digital has shown how an innovation program can lead to a business model where selling experiences takes priority over a rigid, ingrained solution approach. In order to make the offering successful, Deloitte Digital has found an unusual balance between exploration and exploitation. The recipe combined an innovation program committed to rapid prototyping and concept proofs instead of lengthy commercialization plans, with a design-oriented, user-based mode of thinking about client experiences instead of off-the-shelf service solutions. The Deloitte Digital case study illustrates how an innovation program can work when the focus shifts from ideas to execution. At the same time, when tested and refined in the forge of the marketplace and with the benefits of understanding the user experience, the best client solutions included new products and services. Innovation, especially when embedded in technology, prospers when it is fast, cheap, and mobile, while being tested and re-formulated in collaboration with users rather than in a laboratory.

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CO-DESIGNING BUSINESS MODELS: REFRAMING PROBLEMS

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Business model literature seems to flourish these years and the research field is looking for inspiration in other areas than before. This is because companies can no longer rely only on primarily analytical tools – the tendency is a move away from planning to the more creative act of modelling providing a gateway for design thinking and making. Still though, few attempts to apply design thinking in a business model setting have been tried out. Through two participatory design workshops and four business cases this paper investigate through direct design experiment how different design processes, activities and learning styles can improve dialogues on business model development and get participants to work with 'future state' alternatives. It presents initial principles in relation to design processes and discusses through close video analysis how different design activities support reframing and broadening of the initial problem statement.

Keywords: Business model design; Design in management; Design thinking

INTRODUCTION

In recent literature and practises the field of design are investigating the potential in using design competencies - hereunder design approaches and methods - in the business model field. At the same time business model research are moving towards integrating more designerly ways of working with business models, but are often not using the same terms as designers. Therefore the opportunity to experiment with design in a direct business setting has never been more relevant.

If we take a look at design management literature the last decade has had several influential authors who all advocate for the idea of design thinking as a vital component, not only in the development of products, services and experiences, but as well in business, organizations and management (Boland et al. 2004; Dunne & Martin 2006; Martin 2009; Brown 2009; Buchanan 2008; Cooper, Junginger & Lockwood 2009).

If we delve into a couple of the most known ones Roger Martin, dean at the Rotman school of management, and initiator of the business design programme at the school, has some visionary points (Dunne & Martin 2006; Martin 2009). First, he advocates for approaching management problems as designers approach design problems, while also putting an agenda forward on moving design thinking into MBA courses. He furthermore elaborate by saying that:

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My belief is that we have to change from traditional work patterns to something that I think of as 'design shop', which means changing on a continuum along five dimensions: Flow of work, Style of work, Mode of thinking, Source of status and Dominant attitude. (Dunne & Martin 2006, p. 513)

Second, Martin distinguishes between two schools of thoughts in business. On the one hand we have a 'strategy based on rigorous, quantitative analysis' with the basis of analytical thinking. On the other hand we have an approach based on creativity and innovation based on 'intuitive thinking, the art of knowing without reasoning'. He concludes that 'neither analysis or intuition alone is enough - in the future, the most successful businesses will balance analytical mastery and intuitive originality in a dynamic interplay that I call *design thinking*'. This is maybe a bit stereotypically as I have stumbled upon managers who have certainly applied abductive reasoning (but they have probably not learned it at business schools), but the notion and the argumentation of the shift in the approach is an important contribution.

Third, his foremost contribution besides the overall visions is he formulation of what he call 'the knowledge funnel' that is the illustration of the process designers use going from *mystery,* over *heuristic*, to *algorithm*. While design researchers typical have not wanted to make a single design process description because it goes against the nature that every project has a different or unique process, Martin succeed in making an abstract formulation of the nature of the process, not guidelines as such. Traces leads back to Rittels 'wicked problems' (1973) and Schöns *the reflective practitioners* (1983).

If we shift to the industry and IDEOs frontman Tim Brown (2009) is talking about moving away from 'reliability' towards instead 'viability' and at the same time striking a perfect balance of desirability, feasibility (referring to technology) and viability of products and businesses. By viability he means 'what is likely to become part of a sustainable business model'. While the business model and business perspective is mentioned by Brown it is treated as a part of the product or service development and depending heavily on that. There is no attempts to work with the business model in a designerly way.

Cooper, Junginger & Lockwood (2009) traces the progression of design management dividing it into three stages: (1) Design management in the context of manufacturing, (2) Design management in the context of marketing and branding and (3) Design management in the context of the organization and society. An important point in stage three is the shift from 'designing as managing' to 'managing as designing', in spite of this clear point stage three still seems to be in its infancy maybe because of the lack of empirical backing.

Boland et al. (2004) talks about shifting away from traditional scientific management by incorporating a 'design attitude – a shift away from empty platitudes about goals'. They illustrate this by following the practice of one of the most influential architects of our time Frank Gehry. This is one of the only studies with more practical, direct analyses of how to use design in organizational design but still it only scratch the surface.

Though very influential few of these approaches have been informed by direct research through design, making it hard for managers to really see the potential and make radical changes. As designers we should hold on to that design thinking is informed by the doing and vice versa. It seems like we are forgetting maybe the most important asset of design; that is the *making* component in contrary to only *thinking* to convince managers of the importance of thinking through design making. As Buchanan express:

> *Enthusiasm alone, however, will not be enough to sustain interest in design, particularly when the concept of design as a discipline of thinking and making is still widely misunderstood or poorly understood. There will have to be tangible benefits, and the benefits will have to be understood as a clear outcome of design thinking.*
> (Buchanan 2008)

This research was motivated partly by this lack of making an impact through direct design making and partly by what I have seen in past projects. For example in a project collaboration with a company developing a new digital magazine for the iPad I noticed that few attempts to systematically work with the surrounding business model were included - this is not to say that they didn't talked about how to get revenue streams, but none separately process attempts were made in this area and definitely not design-led activities.

I have seen a pattern in these projects, where product development leads the way, after finishing the product and about pre-launch time business models or plans are considered in a highly analytical way. In between all this or sometimes later on when launched reorganizing of the structure of the organisation is considered and sometimes initiated. I started to think about this type of process pattern; was it ideal? Could it be done another way? In another project – an entrepreneurial attempt to create a large sports experience centre – we experimented with throwing in a business model perspective very early on in the concept development and treating the activity, as we would normally work with other design activities. What surprised me was the development dynamics in the intersection between the experience design and the business model – new ideas from the business model activities helped moving the experience design along and vice versa. To illustrate how I work with design in a business setting a brief exploration of what constitutes 'design thinking' is needed.

UNPACKING 'DESIGN THINKING'

The highly popular 'design thinking' terms are discussed both in academic literature and on various blogs from notable authors. As other fields has started to turn their attention to design a suddenly demand for describing the field has come to surface. This creates a dilemma for the design field, which has been holding back on describing their own field because of 'the risk of oversimplifying its object of study' (Dorst 2011), while at the same time keeping a sense of mysticism about how designers work. Influential authors has criticized the widespread use of design thinking which they see is on the way to lose its meaning, for example Badke-Schaub et al. (2011) with a provocative headline 'A paradigm on its way from dilution to meaninglessness?', Norman (2010) who talks about 'design thinking as a useful myth' or Nussbaum (2011) who states that he has moved on to consider 'creative intelligence' instead. Whether we call it *design thinking, design making* or something else is from my point of view not the point – the point is what inspirational thoughts or previous experience one work with. Therefor I will briefly unpack 'design thinking' in regards to the foundation I have used for the workshop setting and this research in general.

A good place to start is to determine which kind of design study I work with in this research. Cross (1999) differentiate between three main categories of design research:

- *Design epistemology* – the study of designerly ways of knowing
- *Design praxiology* – study of the practices and processes of design
- *Design phenomenology* – study of the form and configuration of artefacts

This research lies mainly within *design praxiology* while the related research on a single design activity – the making of a pinball business model representation (Buur & Gudiksen 2012) - also touch upon design phenomenology.

Others like for example Dorst (2008) have made a division of study areas. Dorst criticises that far too much research is done on the *design process*, while he advocates for more research in *the content* (design problem/design solution), *the designer* and *the context* in which the activity takes place. Admittedly, this research also deals with *the design process*, but it is just as much about the change of *the content*. *The designer* is out of scope in this research, though it could be an interesting theme in the future especially in a business setting. *The context* is not central in these cases.

If we try to demystify the core of design thinking in falls into four major categories: *types of reasoning, the type of the design problem, learning approaches* and *design making essentials*. Types of reasoning, which is mostly referred to Peirce and abductive reasoning or a balance between divergent and convergent thinking (Dunne & Martin 2006, Lawson 2006, Kolko 2011, Dorst 2011) seems to be an area with consensus – abductive reasoning is how designers work with problems. It relate as well to Martins previous mentioned knowledge funnel. The type of design problem is another direction of research, which can be traced back to Rittel and Webbers distinction between 'tame' and 'wicked' problems or Simons ill-structured problems (Simon 1973, Rittel & Webber 1973, Buchanan 1992). Design researchers also experiment with different kind of learning approaches this include visual learning typical through sketches and drawings (Goldschmidt 2003, Menezes & Cross 2006), tangible learning through materials (Hornecker & Buur 2006) and embodied learning or bodystorming (Dourish 2004, Oulasvirta 2003). The last direction is a focus on certain kind of aspect or mechanics to create 'future state' dialogues for example design games (Brandt 2006, Iversen & Buur 2002) or different kind of prototyping like 'experience prototyping' (Kelley 2001, Buchenau & Suri 2000).

There is no need to disguise that I have a certain overall agenda in this – finding out what role design thinking can play in business and organisations, while also identifying barriers to overcome if the full potential of design thinking in business setting is to be realized. If designers cannot show the potential through making then we have failed to convince.

- In what way can we show managers to think *through* design? How is it possible to test and further train managers' *abductive* skills?
- How does visual, tangible and embodied learning work in these new areas and in what way can one demonstrate the potential? In what way can we shift dialogues from 'what is' to 'what could be'?

PARTICIPATORY DESIGN

This research has a foundational grounding in the Scandinavian tradition of participatory design. Key principles within participatory design is about equalising power relations, situation based action, mutual learning, tools and techniques and democratic practises (see Greenbaum & Loi 2012 and the special CoDesign issue for further elaboration on participatory design).

An example of the power of participatory design especially in the fuzzy front end can be the issue of framing and reframing or simply frame creation – a central point in design (Dorst 2011, Hekkert and van Dijk 2011, Paton & Dorst 2011). In participatory design instead of having a 'brief' and a traditional negotiation between company and designer or consultancy bureau, the brief and

the framing are negotiated in participatory design workshops, where designers and company representatives interact together and find a shared frame for the project. There are several benefits in this: The designer has the opportunity through the facilitation to be on 'home ground', both designers and companies get an ownership of the 'reframing' of the problem situation – a mutual learning, and every participants has something to 'say' in the process.

I started out this journey of design making in a business setting by investigating the potential of participatory design in the emerging and highly relevant business model research field. What is interesting about the subject business models is that when I talk with firms about new project collaboration both managers and designers find it important to be part of the development processes, in oppose to product or service development where managers often send other employees, designers or people without direct strategic influence. Furthermore a business model involves both internal organizational processes and the product and service value proposition. It is the core of the business logic.

BUSINESS MODEL DESIGN

In business model literature a tendency towards using design as an innovation factor is emerging. Why is that? Mainly because of more rapidly new technologies, a wider market because of globalization, the knowledge revolution and a need for more systematically innovation not only in product or service development but also in the business model. Some studies in innovation highlights the importance of creating a balance between *strong ties* be that productive, reliable, and long established and *weak ties* be that speculative, unpredictable and facilitating serendipity to obtain success (Powell & Gordal 2005, Cruickshank 2010). Hamel (2007) illustrate through a model that innovation can lay within different levels: *operational innovation, product/service innovation, strategic innovation* and *management innovation,* with the last one as the most influential if successful and based on 'innovation in management principles and practices'.

As in many other fields business model researchers struggles with a consensus definition of what a business model is ranging from *a description, a statement, a pattern* to *an architecture, conceptual tool* or *a framework* (Zott et al. 2010). In prose text it is about value creation (for the customer) and value capturing (for the firm). Osterwalder & Pigneur defines a business model as 'the rationale of how an organization creates, delivers and captures value'. The only thing I would like to change is maybe the word 'how' as it limits the definition to only include what is already there, not 'what could be there' – a future state.

A focus in recent years has been on introducing new kinds of business model types as the prevailing ones. Anderson (2006, 2009) focus on what he terms 'freemium' business models, where a certain amount of people or customer segment get a product or service for free sometimes in a limited time period, while other segments pay for the product or advanced features. Chesbrough (2005, 2006) with the agenda of open innovation and open business models opening up for central partnerships, stakeholders and users. A final example of these archetypes are crowdsourcing or crowdfunding (Hove 2009, Lawton & Marom 2011), which is a kind of democratization and collective response were users finance upfront with an amount of their of own choice, sometimes cutting away the middlemen (or one can argue that the online platforms are the new middlemen). While there are valuable patterns in these archetypes descriptions they are also setting a limit that could turn out not to be a fruitful one.

Another recent direction and where one would start to see design approaches is a search for frameworks, which can explain and describe the core components of business models. A highly popular one is Osterwalder & Pigneurs (2009), which is based on nine building blocks or key components to a business model and are co-created by 270 practitioners or so they claim. Another framework is Ankenbrands (2011), *the Butterfly Framework*, but only with five elements arguing that people think in sequences and cannot work with nine elements at the same time, they need to think in sequences.

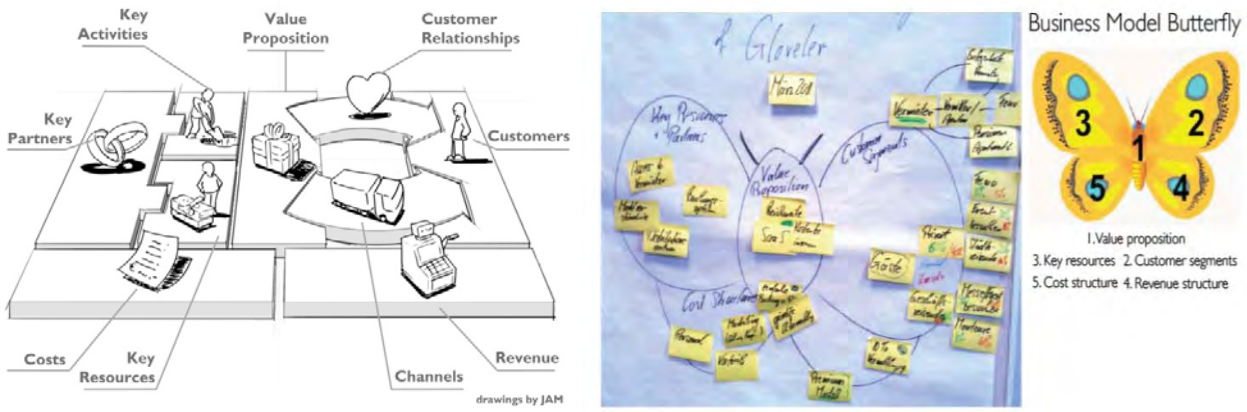

Figure 1: Osterwalder & Pigneurs Business model canvas on the left

Ankenbrands business model butterfly on the right

While these frameworks are very important because they deliver a shared language or a terminology easy to approach and communicate for everyone (and indeed a good starting point), they also have boundaries and constraints that are needed to break out of occasionally to really put oneself in a design thinking mode. For example Zott et al (2010) has looked at business model design from an activity system perspective with the argument that there is a need for improved knowledge about how to describe the architecture of an activity system. They explain it in three so-called *design elements*: (1) Content – the selection of activities, those that are performed, (2) Structure – describes how activities are linked and their importance for the business model and (3) Governance – refers to who performs the activities. Though this is one step in the right direction they still practice primarily analytical approaches, but the notion of a business model being a system or network patterns should immediately trigger designers' interest in this field of research – systems shouldn't be an unfamiliar thing for designers.

Chesbrough (2007), one of the leading figures within business model research, provide us with a kind of stairway identifying six stages: (1) Company has an undifferentiated business model, (2) Company has some differentiation in its business model, (3) Company develops a segmented business model, (4) Company has an externally aware business model, (5) Company integrates its innovation process with its business model and (6) Company's business model is an adaptive platform. In what way can design help business move from stage 1 to stage 6? McGrath (2010) has an important notion that firms in many fields no longer can rest on 'sustainable' advantages but are on a hunt for 'temporary' advantages and at the same time she advocates for a discovery-driven approach.

Forty years after Rittel's introduction of the term 'wicked problems' to characterise design work (Rittel et al. 1973, see also Buchanan 1992), I now suggest to look at business models from a similar perspective and therefore as an area of interest for design. Not only is the business model

important, in some cases the innovation or competitive advantage rests not in the product or service offering, but in the business model itself.

Some initial research attempts exist. This include Buur and Mitchells (2010) introducing of the concept of ‘tangible business modelling’, Ankenbrands way of working with ‘collectively staging business model’, but other than that little research exist in what I would call direct design inquiries with the business model area. Two questions are investigated in this research:

- Why does the value proposition change because of the active application of a business model perspective?
- Which kind of design activities succeeds in reframing the initial problem formulation?

RESEARCH APPROACH, THE SETTING AND CASES

I and a couple of colleagues challenged companies to think about and further develop their business models as well as the value proposition offering. In action research we as researchers are involved by coordinating, observing, reflection with the participants and afterwards with each other, especially the reflection part is important related to the reflection-in-action (Schön 1983) but also reflections after actions. As design researcher, I work with businesses to propose a new course of action to help their community improve its work practices.

We held two workshops with each involving two business cases. Participants in the workshop were business case representatives, entrepreneurs or practitioners from different firms, and students typically with an interaction or experience design background. Through video documentation I look especially for interactions that occur together with a change in conversations or body language related to multimodal and conversation analysis. Four cases were used; a media house, a theme park and an interior design firm. As this research builds upon four cases so far it is still in an exploratory research state.

CASES

The first case was about a media house struggling with the question of how to get revenue streams from digital content, which is a problem many newspaper organisations are forced to deal with, because of decreasing sales of the physical paper. Here one can really talk about a ‘wicked problem’ – there is no stable definition and no ‘right’ answers. The specific idea presented at the workshop for the participants was about creating a plus universe in which the media house will try to use some of its huge archives of information, pictures, stories and son to create an exciting digital universe for dedicated users – the plus universe was about the local sports.

The second case was about a theme park trying to at the one hand deliver a more easy and effective experience moving around the park trying out amusements and on the other hand getting customers to use just a little bit more money in the park. The company presented a number of challenges for the participants as the starting point for the workshop. Some of the start-up ideas presented were a digital wristband that could be used for payment around the park, use the season-card for payment throughout the park and create a point-based loyalty program.

The Third case was an interior design company with a rather large market share of customers within retail stores with the major difference compared to the other cases, that this was a business-to-business company (B2B). Here the focus was on how they could integrate more digital layers into the design and at the same time show the potential of these new offerings to the customers, maybe also finding a new customer segment.

The fourth case was a holiday resort providing exercise and sports activities still trying to establish a foundation and getting a hold on the uniqueness of the activities they had. As they were in competition with a lot of other holiday resorts in the region they tried to move away from being a holiday resort to a place for Mountain bike enthusiasts the fulfil the potential of the nature site. The big question was how to establish a business model around this rather radical change in the firm.

THE DYNAMIC CHANGE OF THE VALUE PROPOSITION

In the initial planning work I was keen on approaching the workshops from a set of design process principles, without having a strictly way of doing this – as needs in the different cases were identified underway.

STEP ONE

> *By using the strengths of the business model frameworks (in this case Ankenbrand) – the shared understanding and terminology – a foundation or status quo was established by moving around the business model components in the framework.*

Discussions between the case representatives and the other participants was fairly much about the status quo as suspected, but some of the participants already here suggested for example new segments or new value proposition. So new ideas was discussed but not tried out. By moving around all the business model components in Ankenbrands framework the participants became aware of missing parts or elements to have a further look at.

If we compare two of the cases – the media house and the theme park - they had different entry points to business model development. The media house case has a lot of value proposition, using a lot of time on describing and proposing different kind of value propositions (see the picture on the left), while the theme park moves around, not really considering the value proposition separately before the end of the butterfly session.

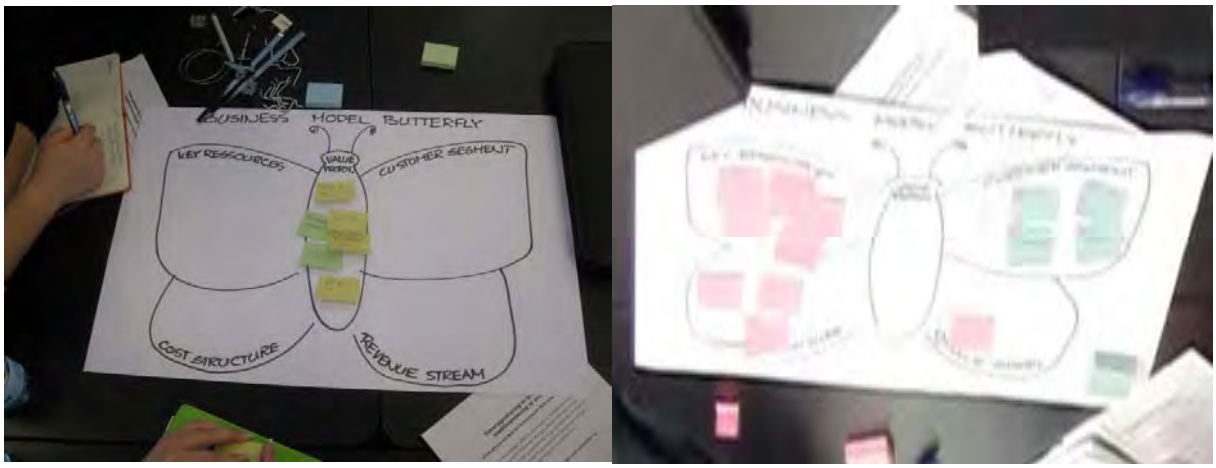

Figure 5: Pictures of the butterfly process.

Media house case on the left. The Theme park is on the right.

The media house was forced to consider if the many value propositions would lead to a change in revenue streams while the theme park was trying to figure out not only revenue streams, but also how value propositions could be created to secure or support revenue streams. This can be related to *strong ties* and *weak ties*, where the media house only have few strong ties left, so they experiment with both, while the theme back has a solid foundation already therefor more looking at

weak ties. The session in the workaround in the butterfly model didn't provide a significant reframing of the problem.

STEP TWO

> *Deep Dives – here the intention was to break out of Ankenbrands butterfly model and go deep into exploration of a single business model component. This included visual learning by the use of pictures to discuss value proposition with or customer actors (a light version of personas). Tangible learning where the participants played around with resources and negotiated about them, a kind of value exchange, and a pinball game playing with marble balls to support discussions on potential customers and revenue streams. Also a kind of bodystorming was tried out corresponding to Ankenbrands collectively staging method (Ankenbrand 2011).*

In the two workshops we tried out different design activities – not all led to a new understanding of the problem. The pinball game seemed to in every cases at least raised an awareness of central problems and discussions about central design paradoxes which Dorst (2011) has investigated is the way experienced designers work 'they only start working toward a solution once the nature of the core paradox has been established to their satisfaction'.

The customer actor session (figure, right picture), only used in the second workshop, succeeded in giving a much deeper understanding of customers needs, behaviour, goals and so on than a traditional marketing segmentation could do. That is even though is was a light version of personas without any fieldwork, so one could speculate about the potential in using design ethnography directly in the business model development.

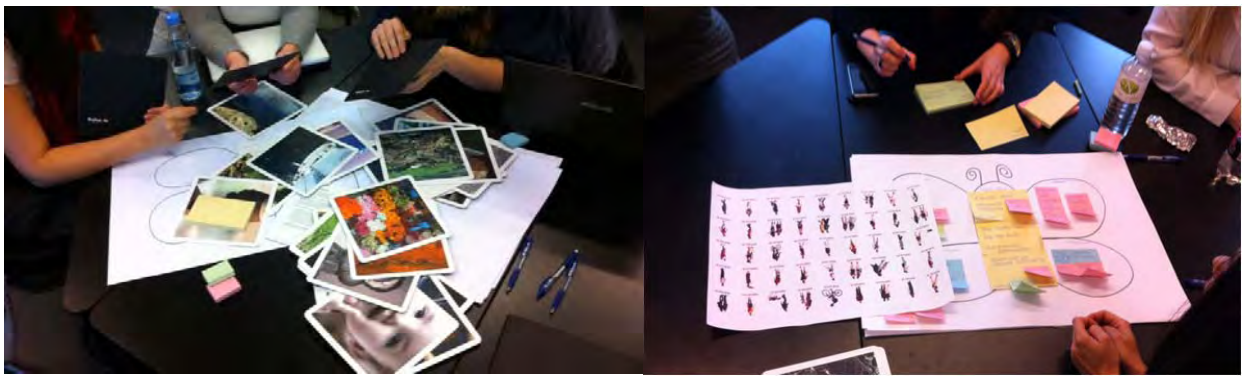

Figure: To the left the group working with visual representation of the value propositions. To the right the group working with creating 'customer actors'

Overall the deep dives raised a new understanding and a significant different frame creation in most cases.

STEP 3

Going back to holistic view – to always have an understanding of the holistic or relational perspective. What does this mean for the other business model components?

Midway through the day the media house group returned to the value proposition after having worked with the upper left butterfly wing *key resources* and the upper right *customer segments*. They discussed if the value proposition had change since the start of the day:

D: "Be more sharp on customer segments"

E: "Have you any idea how big your customer segments are?"

G: "There is not really something in between digital product and physical paper"

D: "Have you asked what they want?"

***A:** "Yes we have. They say they want to closer to the club and the players."*

D: "Could you imagine that it doesn't matter if you give it away for free at some of your websites?"

H: "Give them some of the content, and then cut when it is really exciting. Demos. They have to read the last part."

***A:** "Here the problem is that we give them three lines or a headline to story is out there and they can read in a free website."*

The participants challenged already at this point the value propositions from the beginning of the day, so the discussion shifts to what else could be offered. This continues in the final design session of the day where the two groups each created a pinball game, which in a sense brought almost all the elements, discussed during the day into consideration. At some point in this session a so-called 'X-factor' was introduced to illustrate that they needed a new value proposition to really win over customers. By the end of the day and going into reflection mode the participants in the media house case discussed that even though they started out with plenty of value propositions none of them proved to be certain to give any revenue streams.

G: "I still feel like they have to offer something unique, not just one thing but many. The Archive is not enough. Then you have to theme it and making it fit to the segment. Concrete things that you can't get anywhere else."

H: "You have to maintain the customers on the long run."

D: "Do something in the physical space that leads back to the digital."

G: "Competition where you can win a big prize."

E: "Get on tour with the players."

It was fairly easy to see that the media house representatives were now more certain that they needed to come up with further value propositions to win over market segments from competitors. The communication and dialogue through the design processes triggered and provoked an understanding of which value proposition the group saw as unique for example the large sports archive, but also made them aware that while they had unique content it was not going to be enough to generate the needed revenue streams. In the end the value proposition that could be the decisive factor in generating revenue streams was 'the X-factor' without figuring out what it could be.

POSSIBLE STEP 4:
Double deep dive and relations between two business model components.

This was not a step I tried out in the workshops but I became aware of it underway, as I saw – especially in the interior design firm case and the holiday resort case – that when they worked around the butterfly model and then dived into single components followed by a return to the butterfly, they started to touch more upon the relationship between business model components

and at some point it became the most interesting exploration theme (but because of the time limit I didn't see the full potential of this).

ELABORATING ON DESIGN PROBLEMS AND DESIGN PARADOXES

If we dig deeper into the start-up design problems in oppose to the reframing in the end we can illustrate this by the theme park case. Here the participants worked their way around the business model not placing anything in the value proposition before the end, but in a sense many of the ideas discussed were part of the value proposition. The presence of the butterfly model offered a business perspective to the ideas. The group would move from one field and look for ideas and relate the developed ideas to other of the fields continuously and in this process the business perspective was especially evident in two cases. An idea was developed in relation to intelligent armbands – here it was suggested that the owners of summerhouses would become, so to speak, ambassadors for the theme park, and when renting out their summerhouse to their visitors they could also rent out an armband, that would allow the visitors to enter the park.

The group had a fluid use of the butterfly model in the sense that they would relate an idea to several of the fields while discussing it – this meant that they allowed themselves to discuss the ideas from different perspectives and to investigate if there were any weak points in the ideas. The theme park group developed several ideas that were diverse in both terms of offered value and choice of technology, and it is important to recall that the outset was new technologies that might support intelligent payment systems. The group switched between discussing an 'all inclusive' value proposition corresponding with the existing business model and a new way of making customers use just a little bit more by changing the route or behavior in the park.

They discussed fairly much two customer segments: Those who buy season passes and those who only would come one time or a couple of times in a year. Along the way the focus was moved to the 'season passes' segment because they are the ones who could use a bit more money, because the one-day visitors already used a lot. They continuously were forced to discuss dilemmas between ideas for new revenue streams and how it would change existing experience value proposition, maybe damaging them. Here they talk about the 'all inclusive' value proposition and in incoming revenue stream and what could hold customers back from buying that:

G: *"But has it something to do with the customers not acted on rationality then they already are in? So they won't buy it (all-inclusive) beforehand?*

B: *"Yeah, that would be a consideration, but then again we still believe that there are a customer segment which would like to have that offer, because they recognize it from for example southern European cities. Others in Denmark have high success through all-inclusive value proposition."*

E: *"If the offer really was all-inclusive, me and my family would think it is awesome. Then you don't have to think about payment when you want to eat and you can just continue. If that is not going to cost too much…"*

B: *"It's mainly because of the fear of what the outcome would be, but you can say McDonalds do it. They have soda out in the areas."*

In the media house case the starting point was the product value proposition and it ended being challenged and changed to a 'X-factor' component. In the theme park case, in a sense it happen

the other way around, through the discussions the new revenue streams were challenged because of their effect on the existing value propositions and overall business model. In a way the *weak ties* should not work against *strong ties* in the sense that new experiments or actions shouldn't work against already existing ones (if the existing works). A difference is also the very close relationship between the value proposition and the revenue stream in the theme park case, and the almost missing relationship in the media house case.

In the interior design company they afterwards focused more on the end customer (the customers who the retail stores had) or discussed new solutions directly to them, but also realizing that this could compromise the relationship to the retail stores. This case also showed a limitation to the business model frameworks or templates, as they had to make room for the link from themselves to the retail stores and from the retail store to the end-customers, which made it even more complex. In a way multiply design problems is at stake and it is hard to find out were to start – does the innovation for example lie in the value proposition, key resources or new partnerships, new revenue stream mechanisms or a new customer segment target?

CONCLUSIONS

A business model design process early in the idea development of the product or service design has the effect or ability that it can change the understanding of the value proposition, thereby leading to an awareness of either altering the ideas, moving them along or maybe dropping them if no business model can be established around them. Jumping between considering the value proposition and the other elements of the business model has a great dynamic impact on the understanding of both and how to continue developing both. For example in the media house case when a new customer segment is introduced it immediately leads back to the value proposition and if that is suitable for that segment or else a new has to been designed.

It can also help to identify if a new value proposition supports or destroys already existing value propositions and the business model around them. For example in the theme park case where a behaviour change in the customers way of moving around or being forced to something through an introduction of new technology or services, maybe would prevent them from returning to the place. A central point where design thinking shows promising potential is in the way it helps considerations of reframing the problem and identify and work around design paradoxes. The following points can be summarized:

- A business model design perspective has the ability to identify strengths and weaknesses in the product or service value propositions and in the business model as a whole. One can ask; does this lead to value both for the customer and the business?
- It can alter or advance ideas, while also leading to eventually dropping them if they are not good enough in relation to the business model.
- It creates dynamics that helps moving both the intended value proposition and the business model development further along, always securing a correspondence or affiliation.
- It gives a relational overview to existing value propositions within the businesses and the business model around them, thereby making choices in relation to the damage or support it could result in.

- By making deep dives and applying design-learning activities participants enter a zone where central design paradoxes are explored, challenged and broadened.
- As designers working in a business model context it becomes even more important to consider relations between business model components as they maybe are even more abstract and complex than those we stumble upon in product or service development.
- The problem is moved from either only being about the product or service value proposition or only about revenue streams, to discussion about how they are suitable for each other.

FURTHER RESEARCH

I think the potential is there to examine this further – I'm not done here - and I indeed intend to do more design research through business model workshops in the autumn with other companies and new design problems. Further research on the prospect of 'integrated design processes' between product/service development and business model development will show how and when they support each other and when they don't. One could furthermore experiment with a third integrated process – that of the organisational structure and culture. If design thinking or making works in all three areas why not pursue them all by integrated design processes or practices? Or at least consider joint design activities.

Detailed analysis about how different learning styles – be that visual, tangible or embodied – can succeed in creating 'future state' dialogues is a related research area, is another interesting area of research, especially there is potential in applying simple game mechanics to move business model dialogues ahead.

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Cautela, C., Pisano, P., Pironti, M, and Rieple, A. (2012). *From conceptualizing to ready-to-sell designing: creative networks and design entrepreneurship in a digital manufacturing era.*

FROM CONCEPTUALIZING TO READY-TO-SELL DESIGNING: CREATIVE NETWORKS AND DESIGN ENTREPRENEURSHIP IN A DIGITAL MANUFACTURING ERA.

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In this paper we argue that new 3-D printing technology is a form of disruptive innovation that is transforming the design and prototyping service sectors. Knowledge Intensive Business Services (KIBS) are growing in manufacturing industries, where they play the fundamental role of boosting and strengthening company innovation and competitiveness. Creativity based KIBS are especially flourishing as they support product innovation in design-driven industries. It is in these sectors that 3-D technology is fundamentally transforming the design and production processes, and thereby the industry's business model. The key feature of this technology is that it allows firms to produce small quantities of customized goods at relatively low costs. This is affecting incumbent companies by adding "Business to Consumer" (B2C) activities to their previous "Business to Business" (B2B) business models, and is accelerating the creation of new design ventures. B2C activities can be undertaken by new, small, firms with few technological capabilities, leveraging external creative sources and crowd-sourcing to create new products. In this paper we describe a number of business model "building-blocks" identified through qualitative inquiry of illuminatory cases. Finally, we develop a number of propositions to do with the business-models of prototyping companies and design new ventures.

Keywords: Creative and design services; 3-D printing; open business models

INTRODUCTION

Knowledge intensive business services are an expanding reality in modern manufacturing and industrial economies. In the form of "bridges of innovation" (Czarnitzki, and Spielkamp, 2000; Miles, 2005) these services connect companies that produce knowledge in the form of new products and processes with companies that apply and implement such knowledge to their own business models (Hargadon, 1998; Hargadon, and Sutton, 1997). Within KIBS, creative services are obtaining an important role, especially in association with design and development of new products (Abecassis-Moedas, Mahmoud-Jouini, Dell'Era, Manceau, and Verganti, 2012). These services - by transferring forms of knowledge from one sector (where it is known) to another (where it is unknown) – sustain companies' innovative processes by supporting the conceptualization and development phases of new artefact solutions. Specifically, prototyping services belong to that area where concept materialization in the form of mock-ups and prototypes supports the innovative process by providing input and feedback which are retroactive to the conceptualization phase for possible redesign operations of shape, product, interactive model, functional structure. (Droz, 1992; Schrage, 1993; Ulrich, and Eppinger, 2011).

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These prototyping services along with creativity – managed by manufacturing companies by using both internal asset and/or outsourced laboratories of physical and virtual prototyping – are going through a phase of fluidity and technological turmoil. Besides strengthening and boosting prototyping service performance, the achievement and spreading of 3-D printing technologies are having a great impact on organizational and business models that work in creativity sectors. By providing the opportunity to produce personalized finite and ready to sell products in smaller quantities, 3-D printing technology is creating new business opportunities for incumbent prototyping companies and increasing new-comers centered on exploiting 3-D printing technology by leveraging on external creative communities and crowdsourcing design Thus, the technological impact does not seem to affect only the reorganization of prototyping services, but especially the rearrangement of entire design-driven activity segments that involve scattered creative network and forces. Literature about KIBS and, in particular, about the services connected with design and creativity is scarce. (Abecassis-Moedas, et al., 2012).

This paper aims to partially cover this gap by examining how the achievement of 3-D printing technology is, on the one hand, rearranging organizational and business models of enterprises operating in creative prototyping and, at the same time, creating new enterprises that exploit the benefits and potentials of the new technology by leveraging on external creative communities and designers. Specifically we argue that established prototyping companies and new comers adopting 3-D technology are characterized by open business models, leveraging on external creativity sources. Qualitative in-depth analysis has been run on an empirical sample made up of three companies, of which new ventures and an established firm.

By the literature rooted frame of “business model” (Johnson, Christensen, and Kagermann, 2004) we have analyzed business models “building-blocks” of the selected companies figuring out their recurrences and divergences in the exploitation of 3-D printing business. With regards to speculative and explorative research, we don’t use the theoretical frame to test hypothesis but only to share a common language and a way to conceptualize the different business components and their relationships.

The article is made of five sections. The theoretical background pin points the features of open-business models. In this section the conceptual frame of business models is also presented as theoretical lens to analyze the empirical sampling.

The methodology goes on to explain the different phases of qualitative and case-studies based research. Tools and protocol are presented.

Findings and data analysis results are expressed in forms of propositions as used in explorative and speculative research. These proposition are supposed to propose a first-sight picture of 3-D printing based businesses.

Based on findings and results, a discussion is presented linking proposition to emerging cultural and economic trends.

THEORETICAL BACKGROUND

Knowledge intensive business services are exploited by companies to booster and strengthen their competiveness and innovation potential.

KIBS cover a wide range of economic service activities including accounting, communication, advertising, engineering, design, strategic management and other more sector-specific knowledge based services. Literature about KIBS is scant and generally companies offering this service typologies have been investigated as “bridges of innovation” (Czarnitzki, et al., 2000; Muller, and Zenker, 2001) or “knowledge brokers” (Hargadon, 1998; Hargadon, et al., 1997). Moreover KIBS related to design and creativity is a quite completely unexplored field of research that only recently (Abecassis-Moedas, et al., 2012) is gaining interest by scholars.

The poor literature mainly pin points the operation logics of these companies in transferring knowledge from a sector – “where it is known” – to another sector – “where it is unknown” (Hargadon, et al., 1997) and some more recent studies try to identify internationalization strategies of design consulting firms (Abecassis-Moedas, et al., 2012)

In these studies design consulting firms are based on a “closed innovation” and “closed business models” leveraging on proprietary asset: their designers or the internationally recognized chief designer; their methodologies and creative process; their “proximity” to clients by the presence of world-wide distributed offices.

Besides these companies there are other entities centred on design activities and creativity assets that are covering a relevant segment of industrial manufacturing that are neglected by research of design and innovation management. These companies – mainly operating in the tail of the innovative process offering skills and capabilities to produce prototypes and mock-ups – are evolving as open design entities thanks to the adoption of the 3-D printing technology. On parallel this technology is becoming the triggering to the creation of new design ventures producing finite products with 3-D printing technologies and leveraging on external creative sources and design crowdsourcing.

Berman (2012) in a recent contribution examining the characteristics and applications of 3-D printing in comparison to mass customization and other manufacturing processes describes the technology as follows: “3-D printing employs an additive manufacturing process whereby products are built on a layer-by-layer basis, through a series of cross-sectional slices. While 3-D printers work in a manner similar to traditional laser or inkjet printers, rather than using multi-coloured inks, the 3-D printer uses powder that is slowly built into an image on a layer-by-layer basis”.

Some technical aspects of the technology are widely acknowledged (Berman, 2012):

- the full integration of printing with a CAD software in order to have a fully integrated design-product production activity along with the possibility of sharing the product technical codes via web reproducing it in different places and with different printers;
- the possibility to use different kinds of materials on the same printer (aluminium, stainless steel, titanium, polymers, ceramics);
- the opportunity fully personalize products on the basis of customers preferences and the possibility to handle some product evolution simply with some refinements managed by CAD;
- the reduction of the relevance of inventory risk and management connected to the opportunity to print on demand the desired artefacts;
- the reduction of materials and wastes to produce single product units.

3-D technology is spreading out, according to different popular economic and technical magazines (The Economist, Business Week, Wired, Make), changing the paradigm and logics of industrial manufacturing and the productive value chains.

A first emergent and acknowledged issue provides that established prototying companies adopting 3-D printing and new design ventures centered on 3-D printing technology cannot be investigated with the classical economic theory related to the management of proprietary asset and completely internalized innovation process. Last acquisitions of knowledge about open organizations (Chesbrough, 2006) seem better fit to analyze 3-D printing based companies, seeking for their business models and their asset management.

An open system model is a model in which the firm create and capture value take advantage of both internal and external resources. Chesbrough (2006) in his book “Open business model: how to thrive in the innovation landscape” analyzed the characteristics that a firm can have for creating an open organization.

In the old model of "closed organization”, companies must generate their own ideas that they would then develop, manufacture, market, distribute and service themselves. For years, this was

the "right way" to bring new ideas to market and successful companies are those who invested more heavily in internal R&D than their competitors and attracted the brightest and smartest employees . Thanks to such investments, they were able to discover the best and greatest number of ideas, which allowed them to get to the market first. This, in turn, enabled them to gather most of the profits, which they protected by aggressively controlling their intellectual property (IP) to prevent competitors from exploiting it. Closed organization then reinvested the profits in conducting more R&D, which then led to additional breakthrough discoveries, creating a virtuous inner cycle of innovation.

The open organization model goes through some organizational characteristics. First of all Chesbrough (2006) underlined the importance of having a new management of innovation that included the process of acquiring and integrating such ideas into the organization and sales them. As “valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well” (Chesbrough, 2006a), in the open organization model, firms commercialize external (as well as internal) ideas by deploying outside (as well as in-house) pathways to the market. Specifically, companies can commercialize internal ideas through channels outside their current businesses in order to generate value for the organization, and external ideas through channels inside their current business.

Some vehicles for accomplishing this include start-up companies (which might be financed and staffed with some of the company's own personnel) and licensing agreements.

Second, in this mechanism the number of ideas that can be potentially produced increases massively. So the companies need to screen their ideas and separate the bad proposals from the good ones: while both the closed and open models are adept at weeding out "false positives" (that is, bad ideas that initially look promising), open innovation also incorporates the ability to rescue "false negatives" (projects that initially seem to lack promise but turn out to be surprisingly valuable). From this point of view the profit of a company is not only gained by using the patents developed, but also by misusing the unused patents and selling them to other companies

Third, the firm’s value is contingent upon its ability to create and lay claim to knowledge derived from participation in various kinds of collaborations with other actors.

It has been shown that connectivity with external actors is important in order for firms to remain innovative (Freeman, 1991), and in the network literature it is commonly argued that firms benefit from the social landscapes in which they are embedded. Scholars writing along these lines have developed important findings in terms of how certain network structures influence firm behaviour and performance (Ahuja, 2000; Baum, Calabrese, and Silverman, 2000; Gulati, Nohria, and Zaheer, 2000). Relationships with other actors help firms to absorb different knowledge (Ahuja, 2000), improve survival rates (Baum, and Oliver, 1991), increase innovativeness (Baum, et al., 2000; Stuart, 2000), improve performance (Hagedoorn, and Schakenraad, 1994; Shan, Walker, and Kogut , 1994) and in general grow faster (Powell, Koput, and Smith-Doerr, 1996; Stuart, 2000).

Some of the literature underlines the firms’ need to increase processes that ensure assimilation of developments in the external environment through progress of absorptive capacity (Cohen, and Levinthal, 1990; Lane, and Lubatkin, 1998; Zahra, and George, 2002). Research has shown that firms need to have competences in areas related to their partners’ in order to assimilate external sources (Brusoni, Prencipe, and Pavitt, 2001; Granstrand, Patel, and Pavitt, 1997; Mowery, Oxley, and Silverman, 1996). Internal capabilities and external relations must therefore be seen not as substitutes but as complements. The ability to absorb external inputs depends on what the firm knows. Another important point is related to the similarity of knowledge bases and how they facilitate the integration of ideas from distant realms (Kogut, and Zander, 1992), because shared languages, common norms and cognitive configurations enable communication (Cohen, et al., 1990). In absorbing new knowledge, the firm also increases its possibilities of making novel re-combinations. Incorporating knowledge bases too close to what the firm already knows will hamper the positive effect of assimilating external inputs. For instance, Ahuja and Katila (2001) suggested

that knowledge relatedness between the acquiring and acquired firms is curvilinear related to innovative performance. Too distant inputs are harder to align with existing practices, and if knowledge bases are too similar it is difficult to come up with novel combinations (Sapienza, Parhankangas, and Autio, 2004). In other words, the effectiveness of openness is also contingent upon the resource endowments of the partnering organization*.

Open business models of the centred on 3-D printing companies have been assessed according to the following (Johnson, et al., 2004):

- Customer value proposition, that explain the specific "job-done" for the customer that alternative offerings don't address;
- key resource: key element (people, technology, product, facilities, equipment, channel, brand) that create value for the customer and company and the way those element interact;
- key processes: the key-activities (training, development, manufacturing, planning, sales but also norms, rule and metric) required to build and deliver the value proposition to targeted customers.

METHODOLOGY

The existing scarse literature abou KIBS based on creativity and design (Abecassis- Moedas, et al., 2012) lays the basis for an exploratory research using proposition that form an initial structure to be used to start future specific research strands.

The used methodology has counted for a case study qualitative analysis using multiple resources and an iterative process where researchers constantly compare theory and data-iterating towards a theory which closely fits the data (Eisenhardt, 1989).

The first activity of data gathering was carried out in order to bound world wide uses of 3-D printing technology, understand their functioning logics and interactive models with the productive technologies and opportunities provided.

In order to obtain this picture of pre-understanding, the following activities were carried out:

- An analysis of 45 articles taken from main international, technical and economics magazines (see table 1), dealing with 3-D printing topic in several articles and special issues; this reading enabled us, at first, to write down the terms and verbs mostly used to describe the technological potentials, the main productive applications, and the most recurrent cases;
- An analysis of 3 blogs on specific arguments dealing with the topic of 3-D printing (see table 2); this analysis – developed on 405 posts/comments made by different blog participants – enabled us to extract users' emerging views on the potentials offered by this technology, on their own experience using and interacting with the technology, on the main cases of companies reported as being users of 3-D printing technology

* We have not included in the analysis of the business model the "profit formula" due to a lack of comparable and consistent data among the selected cases.

Table 1: A selected collection of articles and special issues published by main magazines dealing with 3-D printing technology

Magazine	Date	Article Title	Emergent Issues
Business Week	26 April 2012	3D Printers: Make Whatever you want	- Manufacturers and companies users of technology - Technology working logics - Sectors mainly involved in the 3D printing use
Business Week	09 May 2012	Bre Pettis: 3D Printing's First Celebrity	- Producers of 3-D printing technology - Contexts of application
Business Week	03 May 2012	How About Them Gams: 3D Printing Custom Legs	- Integration between design and prototyping - Customization potentialities
The Economist	10 February 2011	The printed world	- Manufacturers and companies users of the technology - Technology working logics - Prototyping companies using the 3D technology
The Economist	21 April 2012	A third Industrial Revolution/Solid Print	- Manufacturing scenarios - Facts and figures about 3-D printing technology - Technology working logics - Manufacturers and companies users of technology
Wired	05 September 2011	An industrial revolution in Digital Age	- Technology working logics - Sectors mainly involved in 3 D printing use - Manufacturers and companies users of technology
Make	February 2010 Vol. 21	Your Desktop Factory – 3 D Manufacturing at home	- Technology working logics - Producers of 3-D printing technology

Table 2: Selected blogs dealing with 3-D technology

Blog	Topic/Title	Posts/Comments
The Economist	The Third Industrial Revolution	364
Business Week	3D Printers: Make Whatever You Want	8
Wired	Cube indoors and outdoors	33

After these two introductive analysis we conducted 3 semi-structured surveys at Full Professor of Technology Management at Stanford University, at the Westminster University of London and at the University of Turin. These surveys helped to clear up the limitations of 3-D printing technology, the main application contexts that this technology has gained access to (i.e. automotive, fashion, health and care, interior design), some international reference cases about the use of 3-D printing.

The reduced spreading of this technology and the repetition in articles, blogs and case study surveys enabled to find an empirical sampling. This sampling – in coherence with the theoretical sampling criteria in the case study qualitative analysis (Eisenhardt, 1989; Pettigrew, 1998) – is made of cases which have distinctively different characteristics in the use of 3-D printing technology.

In particular, our analysis was founded on three types of companies:

- Materialize, a company specialized in prototyping services which created, with 3-D printing, I-Materialize, a digital connection platform between creative communities and users;
- Quirky, a new venture created around the potentials of 3-D printing, based on the development of ideas and concepts suggested by users/designers which are then promoted by means of e-commerce or more traditional distribution networks;

- Fab-Lab, a global network of design shops that have 3-D technology printers, which works with small businesses, users and craftsmen in the production and sales of their products .

The sample presents companies that work in the world of prototyping services, typically characterised by “B2B” business logics which, with 3-D printing, have grown towards “B2C” logics; and companies that are set up exclusively around this technology using only “B2C” business logics.

The business model analysis of these companies was conducted with two different activities:

- The analysis of companies’ websites;
- The analysis of a subset of articles (24 out of a total of 45) reporting data and information on the selected companies’ business models and competitive behaviour.

We used computer-assisted content analysis (CATA) on the web site analysis. Similar to human coding schemes, CATA generally analyzes content via word usage (Morris, 2004). Relying on text assumes that insights about the business model can be detected through the occurrence of and frequency with which certain concepts are used in text (Carley, 1997; Short, Broberg, Cogliser, and Brigham, 2010). It goes without saying that CATA is advantageous in that multiple texts can be analyzed without suffering from errors and from bias associated to human coders (Stevenson, 2001). We build our dictionary (see table 3) on the “business model block” according with the literature frame on the business model. We choose the representative words for each block selected a set of words (see column “Reference” in table 3) used by Christensen to describe each block. Then we contextualized each word from the reference in accordance with our specific context (see the table 3) .To assess the relevance of different words and their usefulness in measuring the business model in texts under study we then perform a key word in contest analysis (Krippendorff, 2004). For all occurrences of the words included in the dictionary, all the sentences were analyzed manually by at least two authors (table 4: provides some examples of sentences included in the analysis). The results of the analysis was discussed during 12 meeting and 8 conference call. In the Table we provide some examples of sentences that included words of our dictionary.

Table 3: Content analysis dictionary

Business model building block	**Reference dictionary**	**Contest qualification dictionary**
Customer value proposition	Custom*	User* designer*
	Relation*	Collaborat* Participat*
Key resource	People	Crowd* User*
	Technolog*	3D printing
	Product*	Finite* Customize*
	Channel*	E-commerce Shop*
Key process	Manufact*	Digital*
	Interact	Network* Select*

Table 4: Examples of keyword occurrences in content analysis

Dictionary	Sentences
Collaborative	Quirky is one of the biggest reality in the collaborative design field: it creates links and conversations between a global influencer community (people able to advice and feedback to help the design process), the experts of the design team pool and the inventor (Quirky)
Design	Designers will be on-site to accept original product ideas from the public (Quirky) I.materialise on one hand gives the designers the chance to show off their talent and sell their products thanks to a worlwide distribution network, on the other hand the potential buyer can access to a unique products collection realized on demand (I-materialize)
People	For this process to work, you need to find the right people, ask the right questions and appeal to the right market," says Jeremy Brown, CEO of Sense Worldwide, a consultancy that has helped Nike and Procter & Gamble set up co-creation initiatives (Quirky) People made the staff, by the end of this year it's planned they are going to be 80(Quirky)
Develop*	R&D (research and development) canter for big companies which can prototype products (Fab-lab) Fab Lab San Diego program has developed in response to the need to inspire students while engaging them in learning next generation technology (Fab-lab)
Service*	I-materialise is an online 3D printing service, based in Belgium (I-materialize)
Technology	The flexibility given by the type of technology overcomes the 'minimum quantity' so even one single piece can be produced (I-materialize)
3D printing	I.materialise is an online 3D printing service, based in Belgium (I-Materialise)

The content analysis provided the authors the set of sentence useful to identify and assess the business model building blocks to meaningful business elements.

The features of the detected business model were given to three professors of Technology Management to validate. These professors were interviewed during the first phase after they had looked at the websites of the tested companies and at the subset of articles reporting elements and information on the selected case-studies. A methodology process articulation is presented (Figure 1).

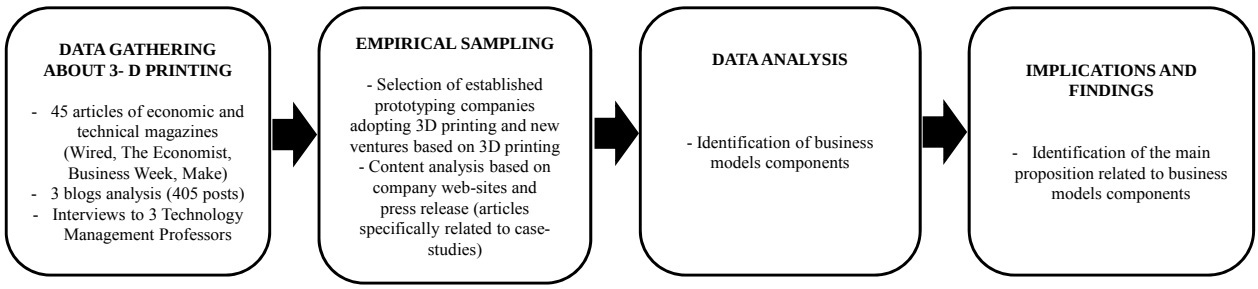

Figure 1: Methodology process

DATA ANALYSIS AND PROPOSITIONS

The data analyzed show that the achievement of 3-D technology is spreading in two different ways: (i) the first as an "additional" service from organizations specialized in prototyping services to companies; (ii) second with the creation of new companies.

The first companies originally offer Knowledge intensive business services(KIBS) which mainly work in the terminal phases of the innovative process where – with prototyping and materializing concepts – they provide input and feedback on the quality and characteristics of products. Such organizations, by materializing objects, provide companies' designers and R&D offices with the input for the revision of engineering and conceptualization phases, paying off the relationship between "thought" and "practice" typical of creative processes. (Shon, 1984).

3-D printing technology, as it results from the analysis, is adopted by these companies both as an advanced technological instrument to keep offering prototyping services to manufacturing companies, and as the creation of new business services for digital platform consumers, where the final consumers and/or designers can conceive their creations and concepts with the chance of use and/or selling them.

With regards to the new ventures founded exclusively on 3-D – like Quirky – these are platforms gathering, collecting and selling ideas and concepts "posted" by external designers and consumers.

These platforms are mainly supported by three types of users: designers who self-produce their own ideas and creations to sell them in their personal channels (*customization driven designers*); designers who propose their own products to market them on the platform (*oriented to market designers*); users looking for products that are not standardized or sold in great volumes on industrial scale (*customization driven users*).

In both cases – whether in the case of additional service development on behalf of established prototyping companies, or in the case of new ventures – 3-D printing technology is associated with an open creativity handling model distributed in those places where companies obtain, bring into production and sell ideas and concepts produced by external designers and clients. In fact, these organizations have:

- A few designers and creative figures: for example Quirky has 8 designers on staff for a total of 40 people in the team) in line with the dimension of Cherbrough's knowledge worker underlined in our literature review;
- A basis of knowledge resources needed when dealing with idea selection and management of products coming from external sources: for example in Quirky, the Ideas submitted received a double evaluation from the community and from the member of Quirky staff;
- The ability to promote the potentials of 3-D printing technology using their own limited creations: for example Fab-lab lend 3-D printing (and other technological devices) to those inventors who can prove their ability –or who have been educated by the Fab Lab Academy to use these technologies properly.

The characteristics of these models can be fully attributed to the models of "open innovation" (Chesbrough, 2003). Open innovation starts with the disintegration of conception-conceptualization-engineering-production-sales activities. The pulverization of integrated value chains (Porter, 1980) gave rise to companies specialized in micro-activities and, above all, to a number of "knowledge brokers" and "bridging ties" that link actors who propose a new knowledge in the nature of new ideas and products with actors who are able to accomplish, implement and sell them .

The "open innovation" model – adopted expressly by companies who use the new 3-D printing technology – may be attributed to the following motivations: the impossibility of meeting the need of market/consumers to have a different business model (the need is that of inventors who don't have the means to produce their own ideas); new market opportunities such as 3-D Printing which enable the production of "ready-to-sell" finite products and change the dynamics of competition; limited barriers for creative communities and crowdsourcing design on a digital network which also affect the dynamics of competition.

With these considerations we suggest the following first proposition.

Proposition 1: *the 3-D printing technology induces established companies and new design ventures to develop open business models as marketplaces or open design shops centred on community and design crowdsourcing*

The management of mainly external creative resources connected with crowdsourcing design together with 3-D printers and machines form the two main assets for both activities of conception-conceptualization and production. The market of the different products generated from 3-D printing is entrusted to the management of distinct distributive channels and strategies. This is valid for both established prototyping companies and new ventures.

Quirky and I-Materialize, for example, extremely excited about the idea of a creative marketplace community, have developed on-line shops giving users the chance to buy products generated by various users-designers. With this, Quirky, – mostly in line with the logic of pushing a distributive strategy – combines a retailing network of products conceived with their own platform. Actors specialized in organized distribution, such as Safeway, Target, Barnes&Noble, Amazon, Toys "R" Us, are only a few examples of partners where you can buy products powered by Quirky. These new relationships bring important innovative elements to the classic models of relationships between manufacturing organizations and distributive channels.

A third distributive model adopted is the open shop design. Cases like Fab-lab have a distributive network in the world with over 50 laboratories open to welcoming designers, production self learners, users driven by the desire of personalizing small products such as accessories, musical instruments, toys. Fab-lab's experience introduces a further innovative element: their territorial presence, which, being often highly integrated with the local social-productive material, determines the direct involvement of the final client, bypassing even the entire distributive channel. The client becomes the buyer but also an important tester of product effectiveness or simply of the idea conceived in the labs. In other words, 3-D printing technology – already in this first exploratory research – does not seem particularly associated with specific distributive models. In other words, there is no structural combination between "technology" and strategies and distributive policies. Given these considerations it is possible to draw the second proposition:

Proposition 2 **:** *3-D printing technology allows new design ventures and established prototyping companies to develop different distributive strategies: direct e-commerce, alliances with distributive and retailing specialized channels, design open shops*

The intrinsic characteristics of 3-D printing technology enable to produce different categories of products, in limited quantities and, above all, without a technological complementary relationship among them. In all of the cases studied, there is an extremely high heterogeneousity of produced and sold categories of goods. Fashion accessories, jewels, toys, shoes, musical instruments, lamps, interior design products are indistinctively found in all product portfolios managed by 3-D printing companies. In fact, the major problems connected with this technology concern the different exploitable materials. The absence of links and technological complementarity among potentially creatable products together with the absence of production scale and volume economies – as found in several cases – lead to a wide and heterogeneous management of product portfolio. The profitability logic is founded on generating profits as well as on a number of product lines with low product volumes(Kekre, and Srinivasan, 1990; Osterwalder, and Pigneur, 2010; Amit, and Zott 2001). This characteristic is found in "open innovation" and "open business" models, where creating new solutions and products is more than just sharing technological, esthetical, or category links of products (Sanderson, and Uzumeri, 1995), they share a fixed knowledge and common processes and dynamic capabilities which they come from. (Chesbrough, 2003). Breaking the technological, esthetical and category links can also reduce the brand power on these productions.. Some categories of the products dealt with – such as accessories, interior design products, jewels – typically linked to brand driven purchasing processes, in 3-D printing cases they lose the signaling value of the brand and acquire the signaling power of customization, which is in turn linked to creative processes and communities. You can buy it on Quirky or I-Materialize because you can share a conceptual and productive idea which is linked to the world of "Making", self-production and distributed design.

> *…I usually buy new products that look interesting to me from a conceptual and productive point of view. I make my personal considerations and criticism about the projects and concepts shown on-line and, if they take the creative direction that I am looking for, I'll buy the derived products. I feel as if I am contributing to the extended*

creative process and, above all, to a new way of perceiving the making and marketing of a product (Blogger, 20/07/2011)

In this case, processes and communities are the new brand drive , shaped by values centered on customization, anti-standardization, creative sharing, and open source creativity. Given these considerations we can obtain the following proposition:

Proposition 3: *The open business model induce design ventures to define a profitability product-portfolio made of a great heterogeneous variety of customized and low volume products with no technological complementarities whereas the processes and community management prevail on the brand management.*

Technology has not an intrinsic value (Teece, 2010). In other words, obtaining a dynamic competitive advantage and transforming it into a profitability position goes through competence (Hamel, and Prahalad, 1990) and dynamic capabilities mastering (Teece, Pisano, and Shuen 1997; Eisenhardt, and Martin, 2000), moving resources and transforming them in values for the client. In "open innovation" models, with greater dynamism, capabilities are limited to physical capitals and mainly come from the management of relational ties and knowledge. (Chersborough, 2006).

Apart from the management of 3-D printing machines, the main activities which are central to the management of 3-D printing organizations are: (i) the management of creative networks and crowdsourcing; (ii) the management and selection of projects, taking care of their visibility and sales promotion; (iii) the management of their marketplace and/or distributive channels (if there are any). These activities can easily be attributed to the "double-sided" business models (Osterwalder, et al., 2010), that is, platforms that connect content providers – in the case of new product conceptions – with their users. This mainly happens in cases where the designer posts new concepts and products to be placed on the creative community market. From this viewpoint, the development of Arduino's adopters' open-source communities enable an interchange that helps to use the technology, and also creates a new knowledge and new ideas: technology becomes an accelerator of spread creativity. Alternatively, like in the case of FabLab, companies are physical platforms – design-open-shops – open to users for the self production and prototyping services of their own artifacts. For what concerns the key capabilities that outline our analysis, we can obtain the following pro position:

Proposition 4: *3-D printing new design ventures are based on dynamic capabilities related to network management, project selection and customer relationship.*

The following table links the value proposition to the practice case analysis.

Table 5: the value proposition linked to the practice case analysis

MAIN PROPOSITIONS	DETAILS	QUIRKY	FAB-LAB	I-MATERIALIZE
The 3-D printing technology induce established companies and new design ventures to develop open business models as marketplaces or open design shop centred on community and design crowdsourcing	Open system model	Marketplace based on online community (65,000 member) and staff member (40 employees of which 8 designers) that through crowdsourcing turn invention/idea in product.	Open design shop based on global network of national and regional labs. The R&D centre linked to big companies to prototype activities.	Marketplace based on the connection among inventors and the technology
3-D printing technology allows the new design ventures and established prototyping companies to develop different distributive strategies: direct e-commerce, alliances with distributive and retailing specialized channels, design open shops	Distributive channel and partnership	-12 retailers -E-commerce direct selling	- Design shop	E-commerce direct selling
The open business model induces design ventures to define a profitability product-portfolio composed by a great heterogeneous variety of customized and low volume products with no technological complementarities whereas the processes and community management prevail on the brand management	Product category /product portfolio	Kitchen; Toy; Home Decor; Lawn & Garden; Electronics; Organization; Fitness; Accessories; Pets; Other	Healthcare; agriculture; housing; communications	Lamps; furniture, fashion accessories, jewelleries and toys
3-D printing based new design ventures are based on dynamic capabilities related to network management, project selection and customer relationship	Dynamic capability	Design team; inventors; and distributive channels management Project selection Costumer relationship	Fab-Foundation; Entrepreneurship centre; Fab Academy management Informal player Project selection capability Costumer relationship	Inventor community management and design team management Project selection capability Customer relationship

DISCUSSION AND CONCLUSION

The development of Knowledge intensive business services in modern industrial and manufacturing economies is speeding up new competitive mechanisms based on different business models. In particular, it seems that a new competitive arena is emerging in services connected with design and creativity, rather than having a pre-existent radical change in the design and creativity professional services. Like the current competitive arena, which features stable and consolidated relationships between large scale production players, incumbent designers and design consulting firms (Capaldo, 2007; Dell'Era, and Verganti, 2010), there is now a new scenario

which features new players (including new comer designers) who base their competitive advantages on external networks that leverage on spreading creativity models. The spreading of design education, the accomplishment of designers – not seen as an elite profession, but as "mass employment" (Branzi, 2010) – the proliferation of instruments and software open to design, the spreading of cultures linked to the "making" and to advanced self-production (Senneth, 2009; Micelli, 2011) together with the potentials of the 2.0 web and social networks make qualified factors and are "the background" for the development of these new forms of design and industrial production.

This latter scenario does not seem, at least for the moment, to be competing with the current one, which is founded on a trading relationship between manufacturers and designers. The reason for this is that the current scenario does not focus on providing design services to companies, but on providing B2C or C2C offer systems to markets where content sharing and the manufacture of products developed in a "shared" way acquire their own value, overcoming the classical logics of fordism trading. In this scenario, new technologies (e.g. 3-D printing) do not have a central or leading role, but they are trend accelerators of a new business model building. The 3-D printing technology induces players, incumbent and new comers to develop an open business models as marketplaces or open design shops centered on community and design crowdsourcing. These distributive models which are found in these contexts often exceed the traditional vertical relationships between producers and distributors. The basic concept is having access (Rifkin, 2001) to an organized and open system of productive resources. Inside this expanding context, products do not have a technological complementarities or branding relationships. With 3-D printers –given material limitations - companies produce, lamps, shoes, accessories, toys, without any kind of category ties and complementarities. The absence of merchandise categories ties induces to reconsider, although still partially, about companies boundaries and the actors relationships within the value chain.

As outlined in the data analysis and empirical evidence of selected cases, in fact, the open business model induces design ventures and prototyping established companies to define a profitability product-portfolio made of a great heterogeneous variety of customized and low volume products with no technological complementarities, whereas the processes and community management prevail on the brand management.

Our analysis, based on 3 empirical pieces of evidence, does not intend to indentify the characteristics of a new emerging industry, but wants to outline some trends in industrial design and production that are becoming complementary and, in some cases, "competitors" of the consolidated models of production and consumer goods. The propositions reported in this paper would like to propose tips for future research paths aimed at finding new business models and new forms of creative business associated with emerging implications and consumer patterns.

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LEADING INNOVATION THROUGH DESIGN

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MAPPING BUSINESS MODELS FOR SOCIAL SERVICE DESIGN IN HEALTHCARE

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If the question of eHealth is framed in a social context of actors and transactions, new opportunities emerge for designing a business model. We explored the concept of Business model *design*, with notably and explicitly referring to 'design' and conclude that from our perspective the modeling aspect is missing. As strategic designers we have the ability to contribute to the solutions of business models. By using, and adequately adapting business model concepts from corporate strategy we took the lead in designing business models In five experiments in eHealth and built upon our capabilities and invent methods and tools for creating business models in a designerly way. With five case experiments, we open up the black box of the process of designing business models and look at what is actually designed.

Keywords: Business Model Design; Healthcare; Service Design

FRAMING A BUSINESS MODEL DESIGN GAP

New social contexts, designers and business model designs

Social roles of industries are transforming from the economics of merely product production to providing father reaching service solutions that impact social relations. Likewise roles of designers are transforming and new terrains of human experience are explored for creating innovative solutions. New on the design agenda is the value of design in improving the lives of underserved populations (Margolin & Margolin, 2002). To that respect, innovations of new business models for the 'bottom of the pyramid' situations, appeal to the ability of strategic designers. Example cases of Garmeen with microcredit services and Unilever with one-serve shampoo portions demonstrate creative thinking in designing propositions with breakthrough economics of manufacturing (Prahalad, 2004). When strategic designers engage in social contexts and find problems that are framed within a network of interactions, strategic designers most likely invent new design-oriented approaches to cope in the new situation. Most notably, design agencies as, Frog and IDEO are venturing on the new terrain of business model design. With Frog for example collaborating with UNICEF in an IDEA award winning project that designs a new business model for a community case management service:

> *…to explore this unique solution-space UNICEF and frog brought together public health, mobile health and design constituencies to create an adaptable model for how mobile can best support Community Health Workers as they diagnose, treat and refer the most common killers of children* (UNICEF playbook, p.2).

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In this social context of health care delivery for women and children in the rural and underserved areas in Africa, interestingly, frog defines its design contribution by a 'model' and deliberately scraps 'business' out of 'business model' that obviously has more commercial connotations. IDEO created an own Human Centred Design toolkit (2010) as a methodological guide focused on

> *…hear the needs of constituents in new ways, create innovative solutions to meet these needs, and deliver solutions with financial sustainability in mind".*

Building on similar projects as Frog, IDEO first acquired and now provides a new expertise of business design that combine design thinking and traditional corporate strategies. Interestingly, this business design expertise is introduced to familiar industrial context of the designer..

From these examples of practice we argue that strategic product designers are found in a position to work within new social contexts. Applying design thinking to a social network area of human experience. In accordance with Buchanan (2001), professional strategic designers conceive the design of business models as our field of expertise.

Designerly modelling of actors and transactions

In these new social context we make use of our design ability of "finding a balance between the technologically possible (an engineering approach) and the socially desirable (a user-oriented approach"(Morelli, 2007). As Morelli already noted, new contextual conditions of social service design require a new methodological approach on the basis of which a new toolbox for designers needs to be defined. An acknowledged way of building new design approaches, is by adopting approaches from other fields and adjusting these approaches for designer's purposes. Like for example, the adoption of ethnographic methods that are transformed into new designerly methods, as for example cultural probes and context mapping (Sleeswijk, 2005).

In this paper we adopt the business model concepts from the strategic management fields and adapt the accompanied analytical approach to a designerly *modeling* approach.

We start from the concept definition of a business model design provided by the strategists Amit & Zott (2001):

> *A business model* ***depicts*** *the content,* ***structure****, and governance of* ***transactions designed*** *so as to* ***create value*** *through the exploitation of business opportunities,* (Amit & Zott, 2001).

For a strategic product designer, first element of interest in this business model concept is 'depicts', referring to a visual object of a model. Teece (2009) has pointed out that "the exercise of designing new business models is closer to an art than to a science". We reviewed the literature covering both streams of strategic management and design in search for a visual object of a business model. We found the quite popular business model canvas(Ostwalder et. al., 2008) for structuring the content elements of a business model with the 'value proposition' element at the core of the canvas and the 'revenue' element in the bottom line. And we discovered 'actors maps' (Schiffer & Hauck,2010, Morelli, 2007) adopted from social construction studies. An actor map, depicts the transactions between actors in a network. A combination of both objects would fit the business model definition. But there we identified a gap in modeling new business model designs.

A second element of interest in the business model concept is 'structure'. This refers to the activity system's architecture of a business model. Logically an architecture is designed, and we asked ourselves how is an activity system architecture designed? In searching for answers to this question in the literature we found two types of activity map objects: customer journeys and service blue prints (Stickdon & Schneider, 2010). These designerly tools are used for purposes of respectively customer insight generation and for designing a service. In a customer journeys the activities of an example customers are mapped in interaction with employees and professionals of different organisations. In most cases infographics or photo's provide the visual elements to illustrate the activities. In a service blueprint a predefined structure is formatted in a template

(/canvas) of front office and back office activities i.e., the parts of the service system that are visible or invisible to the customers. So far transactions with cash exchange are not mapped in these blue prints but could be added.

The third element of our particular design interest in the business model concept is the 'transactions designed'. This element, we perceive as the most challenging. We found some inspiration from the innovation management perspective in the book 'Seizing the white space' (Johnson,2008; Johnson, Christensen & Kagermann (2008) relating business model innovation to business opportunities. In this view the content of a business model holds four pillars. The first pillar, the Customer Value Proposition (1) is based on latent consumers need(s). A business model design needs focus on a proposition to deliver value to consumers to meet the latent need. The profit formula (2) behind the value proposition is needed to make the business model viable and profitable. Perceiving and deeply understanding the customer needs and their willingness to pay, and balancing it by adapting the "business architecture, the pricing model and the competitive positioning" (Teece, 2009). The pillars for the business architecture that structure the proposition are the resources (3), including employees and partners and processes (4). The design of these processes need not to be confused with business model process design that is more related to IT systems configurations with detailed flows of activities. Casadesus-Masanell and Ricart (2009) stress that it is important to simplify the representation of the business models into main categories to be able to work with it from a high level perspective; avoiding detailing allows a business model to remain flexible. To this respect the process design of transactions in business models are closer related to value chains and value networks.

Co-design of value models of transactions

As a last element of our interest in the business model concept, we consider 'creating value' as very important. Zott & Amit (2010) have provided taxonomy of different types of value creation in business models, including: the novelty business model, lock-in business model, complementarities business model, and efficiency type of business model. These characterizations of business models, classify a design of a business model in an analytical way. It provides a frame of reference. By using this in a creative activity, we as designers will shift it from the logical space of problem analysis to the solution space. From a designers perspective the creation of business models for generating value as a solution for a network problem is the challenge. Creating value in social network contexts in new services cannot be addressed by individual designer capability but often require a broader skill set of knowledge. As experienced in many cases the real experts on a certain topic and those with the most insight for a design challenge are the people in the community or end customers. For understanding and framing the problem of new business models mobilizing the input of knowledge to complex problems of social networks makes sense. A growing number of experiments evidence the benefits of stimulating the creative abilities of local communities to co-design a solution. The new social context is often framed within local networks of actors. These actors can participate directly or indirectly in the design of solutions. The identification of the actors is critical to explore the context of interests, skills, and (tacit and explicit) knowledge that can be mobilized.

In sum, strategic designers conceive the design of business models as an emerging field of design expertise in which corporate strategy and design thinking are joined. In this paper we adopt Amit & Zotts business model concepts from the strategic management fields and aim to adapt the accompanied analytical approach to a designerly *modeling* approach. We framed four elements of the business model concept definition and identified a gap in modeling new business model designs. In exploring this new territories of business model *design*, with notably and explicitly referring to 'design', we as strategic designers explored the concept of business model innovation and conclude from our perspective, attitude and abilities that the modeling aspect is missing. We discovered the actors map as an analytical approach that has the potential for adapting into a

designerly modeling approach. And we found related designerly methods of activity maps that have the potential for adjustment to designing transactions. Our central research question is: How to design transactions between actors in a business model objects that creates value in exchange of cash flows. In such a way that the value proposition and profit formula are balanced.

FRAMING EHEALTH ISSUES

If the question of eHealth is framed in a social context of actors and transactions, new opportunities emerge for designing a business model by strategic product designers. New social contexts for healthcare services are influenced by important demographic trends. Life expectancy keeps increasing while child birth is decreasing causing an unbalanced population pyramid. This implies a load for the healthcare system where more elderly will require assistance while less people will be financially contributing and less healthcare professionals will be available. It is forecasted that the pyramid will remain uneven at least for the next 20 years (CBS, 2010). An increase of health services for elderly care in general and chronic diseases in particular, is expected.

Due to a change of lifestyles elderly prefer their home above a nursing home institution environment, an important trend, is to move the services to the patient's home (Koch, 2005). In the Netherlands with traditionally high rates of elderly living in nursing homes this trend is confirmed. Around 7% to 5% of the elderly people over 80 live in nursing homes and around 48% to 37% of the elderly people over 95 live in nursing homes (CBS, 2010). Strategists at hospital and clinics view home healthcare as one of the fastest growing areas of healthcare provision. Driven by management targets to increase efficiency by balancing equity of quality-oriented healthcare with limited financial resources, a solution direction is bringing cares services to the home (Koch, 2005). Overall, due to the increasing interest from individuals in self-managing their health and a preference for aging at home rather than in an institution leads to a shift from in-hospital care services to more advanced home healthcare services.

In parallel developments in information and communication technologies (ICT) have prepared for these social changes. New solutions of eHealth offer possibilities to cope with future trends. The solutions of eHealth evolved from telehealth that was initially defined by:

> *…the use of communications technology to deliver health and healthcare services and information over large and small distances (Picot, 1998; p.200).*

eHealth broaden the domain of ICT technologies and devices, including for example the use of audio, video and other telecommunications and electronic information processing technologies for the transmission of information and data relevant to the diagnosis and treatment of medical conditions, or to provide health services or aid healthcare personnel at distant sites (Maheu & Allen, 2009).

eHealth provides potential solutions given that the use of technology reduces the need to attend personally the patient while it provides an additional communication media to the elderly.

eHealth can address a number of benefits, such as: are:

- *intensify and improve diagnosis and treatment* by sharing information in a faster way, regardless location and in real-time, with patients and between healthcare professionals.
- *proactive lifestyle adaptation* if patients are constantly informed about their treatments, medications and conditions.
- *effective aligning and managing the chain of care activities* that various healthcare professionals perform in for example disease management.
- *patient empowerment* as a result of their growing access to information about diseases and treatments means that support health care services to provide a more focused on the patients‟ growing demands and personal needs, which implies a necessity of tailor-made care.(i.e. Limburg et al., 2010).

So far, a large number of national and international research experiments showed that ICT-systems of eHealth helps patients gain control and moreover helps to reduce health problems associated with the illness. However, *Unclear business models* are one of the major innovation barriers for care providers. Low rates of eHealth implementations indicate that traditional business models of the health care providers do not fit with the self-directed patients and eHealth solutions (Gruber, et.al, 2009).

Herzlinger states that healthcare has become a “lose-lose proposition”, where consumers “pay way too much, and they get way too little” (p.105). She argues that the only way out of the current crisis, highly evident in the US, is to choose for a consumer driven health care model, where patients and providers jointly create and deliver care in better and cheaper ways. Currently the insurance companies, hospitals and government have dealt with a health care model in a top down matter, resulting in a cost increase and choice decrease. She proposes to put consumers in charge of health care as a way to start renewing a system based of consumers‟ demands and driven approach, which will result in freedom of choice, openness and transparency, and a tighter relation amongst stakeholders in order to create and deliver value (Herzlinger, 2007).

To establish a system of home care services that is good, safe, available when needed, accessible and affordable for all, new designs of business models are needed to guarantee this for the future. In our exploratory research we found that: (1) for realizing home care solutions that combine patient’s self-management and eHealth technology, new business models for local healthcare networks are not available yet; (2) and an ecosystem of partners is needed to provide an integrated proposition that extends beyond the healthcare device and home care services itself, (Simonse et. al., 2011).

RESEARCH METHOD

With five case experiments, we aim to open up the black box of the process of designing business models and look at what is actually designed. We experimented with designerly methods in the field of eHealth.

SAMPLE

Table 1 presents the case characteristics of the four case experiments in business model design.

Table 1 Sample of cases experiments in designing transactions for social service design with eHealth

Cases	eHealth issue	Mapping method	Co-designers
Telecom foundation NL (Vis, 2012)	Dedicated Mobile communication support for Hearing Impaired People (HIPs)	Free-format hand drawing	17-20 participants • 3-7 HIPs • 3 HIP organisations • 7 Telecom organisation • 3 Software developer
Homecare provides NL (Crossley Urrego & Soto Camacho, 2012)	Tele-health care for elderly at their own home. Besides support for the nurses, playing games and social community talk is offered.	Service Blue print *standardized format.*	N.a.
Mental Healthcare institutes in Columbia and NL (Nino & Ruiz, 2012)	Telemonitoring for mental health care service delivery at home and at the institution.	Net transaction tool	
Health & Wellbeing company (Griffioen, 2012)	Telemonitoring for Heart failure to keep patients out of the hospital and avoid readmission in the disease management.	Value transaction map	19 participants: • 5 HF Patients • 4 Relatives • 2 GPs • 1 Practice Nurse

			• 2 Cardiologists • 5 HF Nurses in 3 hospitals

In our research by design we decided to experiment in one case project, for a telecom foundation, with free format drawing of business model elements that build up a value proposition by actors who provide value in exchange of cash also drawing the cash flows between the actors. In another experiment we set out for a field experiments with the activity map of a service blue print at a homecare provider. For a third experiment in the mental health we adjusted an actor's map method to the purposes of the designer and invented the Net transaction tool. And finally in a case study addressing heart failure patients we invented a value transaction map based on an activity mapping tool. As co-designers in our experiments for designing a business model we involved a great number of users, professionals and managers that represent the actors in the network of transactions. Such as people from local institutions, companies, service providers, associations and local groups.

ANALYSIS

In this research we used the business model maps in a meta-analysis on the visual displays. We analysed the design outcomes of the designer's efforts in the different experiments. In particular we analysed the business model maps, the visual representations of the artefact produced by the strategic designer.

The contributions in the following sections are examples of methodics derived from designerly adaptation and reinvention of methods. Al these examples are related to the business model problem in eHealth but are detailed in descriptions on *designing transactions* to provide interesting methodological insights into the area of business modelling.

BUSINESS MODEL MAPS: SERVICE DESIGN FOR VISUAL – AND HEARING IMPAIRED PEOPLE _ @TELECOM FOUNDATION

SOCIAL CONTEXT

Almost one in ten of the world's population lives with some kind of disability: limitations in vision, hearing, or dexterity. Currently there is a lot of development in mobile communication technology for Hearing Impaired People (HIP). Many of these products have the potential to improve their quality of life and self-confidence by increasing independency and decreasing uncertainties.

DESIGN CHALLENGE

In exploring earlier projects for HIP people of the Telecom multinational some interesting service concepts were identified, but many of these projects lacked a clear business model. The major design challenge in this case was to design a business model for the HIP in a network of the Telecom Foundation, Telecom business units, government and other non-profit organizations. This fuelled the vision of the strategic designer to design a new service proposition with a profitable business model for the HIPs. Based on the philosophy of inclusive design, making no commercial exceptions for the specific target group.

The first research was aimed to create insights in the communication behaviour and - needs of this specific group. The strategic designer emerged himself into the world of Deaf people and got to know a number of them in bars, interviews and information from internet forums. Based on these experiences, he described the following communication behaviour:

> *… deaf culture is a community on its own. The deaf people in the Netherlands feel part of a select group of people that master Dutch sign language (NGT) as their first language. Because it is hard to easily communicate with strangers on the street, this community*

prefers to connect to each other. Many deaf people go to special deaf bars and events where they come together. Deaf people even have their own sport clubs and Olympic games.

..chatting for mobile communication is still the most preferred way of communication. Deaf people seems to have a preference for one telecom operator who offers data and text only SIM-cards for many years. There is special software available for some mobile phones. This software makes it easier for deaf people to chat, but it is not very popular. Especially the price is a problem and due to the increased functionality of normal smart phones, the upgrade is not worth the money.

…video chat seems to be the best solution for communication between deaf people. Health insurance even pays for it. But it is not part of deaf culture and not 1 video chat system was requested in 2010! Deaf people might be interested in video chatting on mobile phone when it becomes affordable and easy to use.

The second research had to provide insights in the stakeholder context of the Hearing impaired target group. And after some design research by desk study and interviews an overwhelming number of parties seemed to be involved in the subculture of the HIPs. From the context map of a great number of potential actors, two organisations were chosen to explore collaboration options in the design and implementation of a new service proposition.

DESIGN OF TRANSACTIONS

In this case the strategic designer used free-format drawings inspired by flowcharts mapping techniques that were practiced at the service department of a large automobile company where design thinking was introduced. In a real time setting of a meeting, in this case with two actors from two companies.

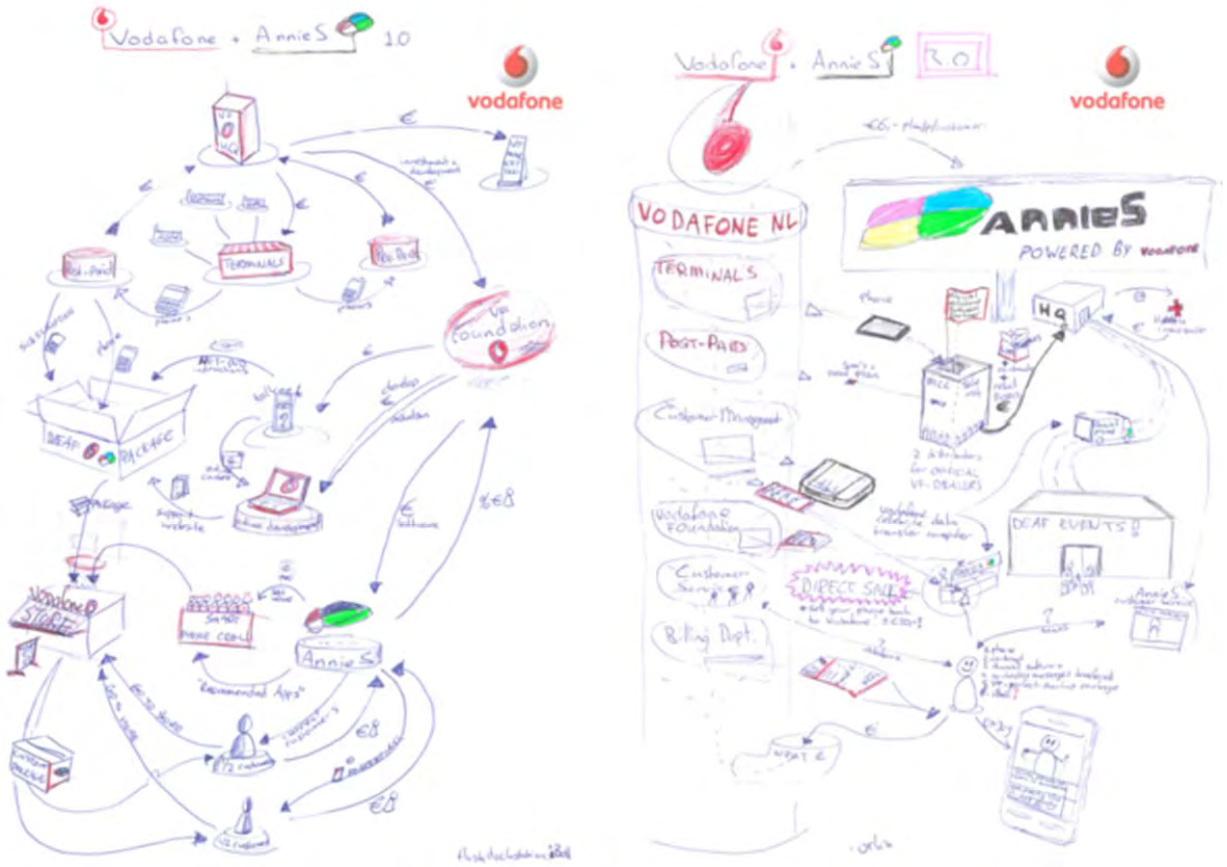

Figure 1: Business model map for mobile telecom service designed for hearing impaired people, Vis (2012).

This free-format method starts with a blanco A4 paper and pencil and markers. The purpose is to draw the model by hand related to the oral explanations in the meeting. The drawing starts with the logo's of the two companies and a drawing of the customer, in this case a HIP. So visually each stakeholder is given an own starting point from where they can explore their position in talking about explicit scenarios of building up a value proposition for the customer. By drawing the flows of money, products and data in a very graphic representation it is possible to visualize a value proposition, but also the needs and doubts in an easy way. So there is not a 'fixed' business model format prepared in advance. With one blanco A4 size drawing and the help of oral explanation it is possible to make a first sketch of a complex business model in about 10 minutes.

After this first sketch individual stakeholders are visited to do a reality check. Each stakeholder provides feedback and detailed info on how to organize the process flows in the business model. For example 'higher' responsible management looked at the flows going in and out from the headquarters, and shop owners looked with specific attention to the flows going in and out of their shop. To our experience each stakeholder was directly focussed on their own position drawn on the map. Knowing their own situation best, this also led to particular input and feedback on changing an actor, flow or detailing estimation. Because the handmade drawing can easily be changed and simplified by taking the pen and adding or scrapping lines and stakeholders. It invites to participate in the development. After every two or three meetings the strategic designer sketched a new version of the business model.

It happened that one of the first business model sketches survived only one meeting when a drastic change had to be made. Eventually, the business model for HIPs was sketched in 4 iterations: from a complex model where existing logistics needed mayor modification and collaboration with the new business partner, to a model where existing logistic flows of both

companies get a minor addition. This model led to an agreement of partnership and within two months a new service for the HIP was launched and communicated broadly.

BUSINESS MODEL MAPS: SERVICE DESIGN FOR GENERAL PRACTITIONERS EHEALTH DATA_ @FLORENCE

SOCIAL CONTEXT

In this case experiment we researched a homecare provider with several offices in the South region of the Netherlands, who provides all types of homecare services. The homecare provides is dedicated to the care of the elderly either at their own home or at one of the nursing houses or clinics. To improve the service, this homecare provides has an innovation department in charge of executing new projects. Recently they received a grant from the government (AWBZ) to develop a pilot project in telehealth.

Existing success and failure cases of the implementation of eHealth evidence a need to better design services that create value for the different stakeholders, in order to be successful in the market. Additionally, most of the current cases are trials or pilot projects with a short term orientation and a small scale implementation. In order to successfully scale these projects to a mainstream level, it is necessary to plan ahead, visualize the different steps, determine how dynamics between actors and processes will change, be able to predict possible problems, foresee possible results.

DESIGN CHALLENGE

Using the Service Design framework, the design challenge is to address the research question of How are eHealth services structured from the business model point of view. And gather insights on value propositions of eHealth in transaction with profit formulas for the owner of the business models.

DESIGN OF TRANSACTIONS

The initial idea was to develop the service blueprint during the interview; however due to time constraints of the participants, the service blueprint was developed by the researchers based on the data gathered in the fieldwork and the coding of it. As for example:

Acquire:

> *…For the moment the pilot is working with the fund from the government, but we are still not sure how we will charge for it in the future.*
>
> *... So the patient fills out a form, the AWBZ evaluates and then decides if he can get the service from us.*

Install:

> *…We explain the elderly about what he will receive, actually is this is one person, because she has a car, she visits them and teaches them how it works.*

Use:

> *…the nurse at the clinic has certain schedules to make the calls to each of the elderly with the service.*
>
> *…to check on them remotely with the 'Good Night' Service.*

Figure 2 shows the Service Blueprint canvas where by mapping the main stages of the service in a horizontal axis and the different actors in the vertical axis, it is possible to visualize the interactions between them as in a timeline.

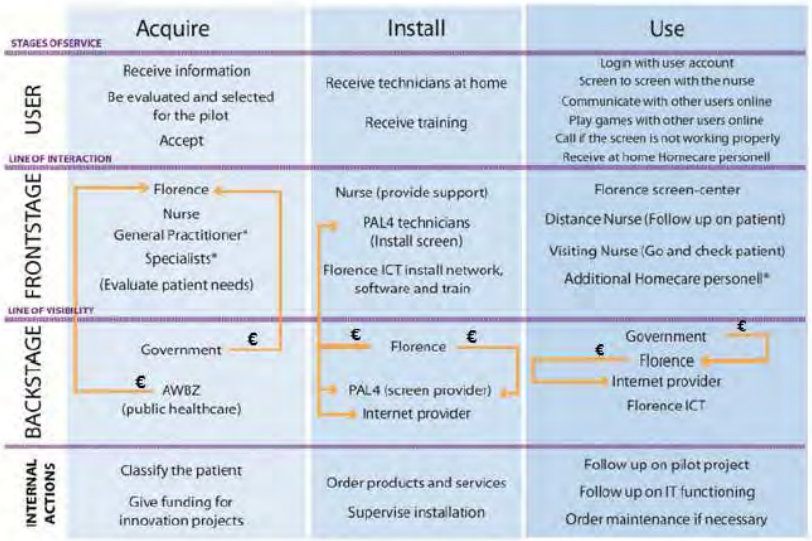

Figure 2: Homecare provider Service blueprint (Stickdorn & Schneider, 2010; Crossley Urrego & Soto Camacho, 2012)

The vertical axis is divided in four rows corresponding to the main components of the service: It has the customer at the top while it goes deeper into the organizations processes including the front stage which refers to all the actors and actions that are in direct contact with the user, and the backstage which refers to all the actors and actions that are necessary to effectively deliver the service even if they never come into contact with the user. An extra line which considers internal actions provides further insight on support processes that also contribute to deliver the service (Stickdorn & Schneider, 2010).

Front stage: The eHealth technology includes: LCD screens installed in the homes of the elderly together with software that provides communication between the nurses and the elderly. Additional functions of the software are a social community where elderly people can socialize on-line and play games with other users such as Bingo.

> *…with this technology we offer our elderly a more frequent attention, we can call them to check on them and actually see how they are doing since the image quality is very good. They can also call us and start the video with just touching the screen, it's very easy to use for them, if they just want to talk to someone or if they need something, they can do it any time, there is always a nurse in the clinic to answer.*

Backstage: The Home Healthcare provider has handled everything in-house buying the technology from PAL4 and future plans to install I-pads instead of LCD screens. By using Service Blueprinting we mapped existing services in healthcare related to the implementation of ICT due to the fact that it can provide a clear visualization of the current situation of the services offered and their interrelations with the existing environment in healthcare services. Moreover it can show the relation between the different actors and the technology being implemented revealing the strengths and weaknesses of each offering. Unfortunately the pilot project hasn't been fully executed due to the fact that many people have rejected the technology or haven't participated actively.

BUSINESS MODEL MAPS: SERVICE DESIGN FOR MENTAL EHEALTH _ @MENTAL HEALTHCARE INSTITUTES

SOCIAL CONTEXT

Columbia and The Netherlands were the countries selected in this comparative case.

Colombia has one of the highest performances in health among the Latin American nations based on the World Health Organization (WHO). It is highly rated in fairness of financial contribution. Colombia is the second best country for scientific and health infrastructure in Latin America (IMD,

2008). The Netherlands is one of the nations with the most responsive (availability of resources) health systems. It has an innovative social health insurance system, where patients choose the provider and health insurance policy which best fits their situation. Information about price and quality are available to consumers.

Table 2 Healthcare in Colombia and The Netherlands (WHO, 2010).

	COL	NL
Total expenditure on health as a percentage of gross domestic product	6.4	10.8
General govern. expenditure on health as a percentage of total exp. on health	84.2	77.2
Private expenditure on health as a percentage of total expenditure on health	15.8	15.2
Out-of-pocket expenditure as a percentage of private expenditure on health	50.0	37.7
Private prepaid plans as a percentage of private expenditure on health	50.0	33.7

Table 2 shows that The Netherlands invests a higher percentage of its gross domestic product in health than Colombia does. The private and out of pocket expenditure on health are higher in Colombia than in the Netherlands. Comparing countries coming from different socio-economically stages of development we believe to enrich the mappings. Our purpose is compare and contrasts the similarities and differences in t the contexts two different countries; a post industrialized one and a developing country.

More specific this experiment concentrates on Mental healthcare. Institutions for mental healthcare that actively conduct research and treatment with patients, ranging from drug abuse rehabilitation to hospitalization and monitoring of bipolar disorders. These institutions provide comfortable housing or stay, where patients have dignity through nice green surroundings and fulfilling social and independent activities.

Telemonitoring is perceived as an apparent opportunity to meet today and tomorrow's mental health care service delivery. However without including these new technologies within an integrated system of wider care, services, resources and processes, its chances of succeeding would decrease

DESIGN CHALLENGE

The main design challenge in this case experiment was to explore and design exchange relations in a stakeholder network of health care organized in order to identify business models opportunities for customer-centred eHealth in the context of Mental Health Care.

And in particular the mapping challenge was to investigate:

- How are the actors actually connected and related to each other?
- What are the desired contributions and demands of the different actors?
- What is the level of satisfaction or investment in these relations?

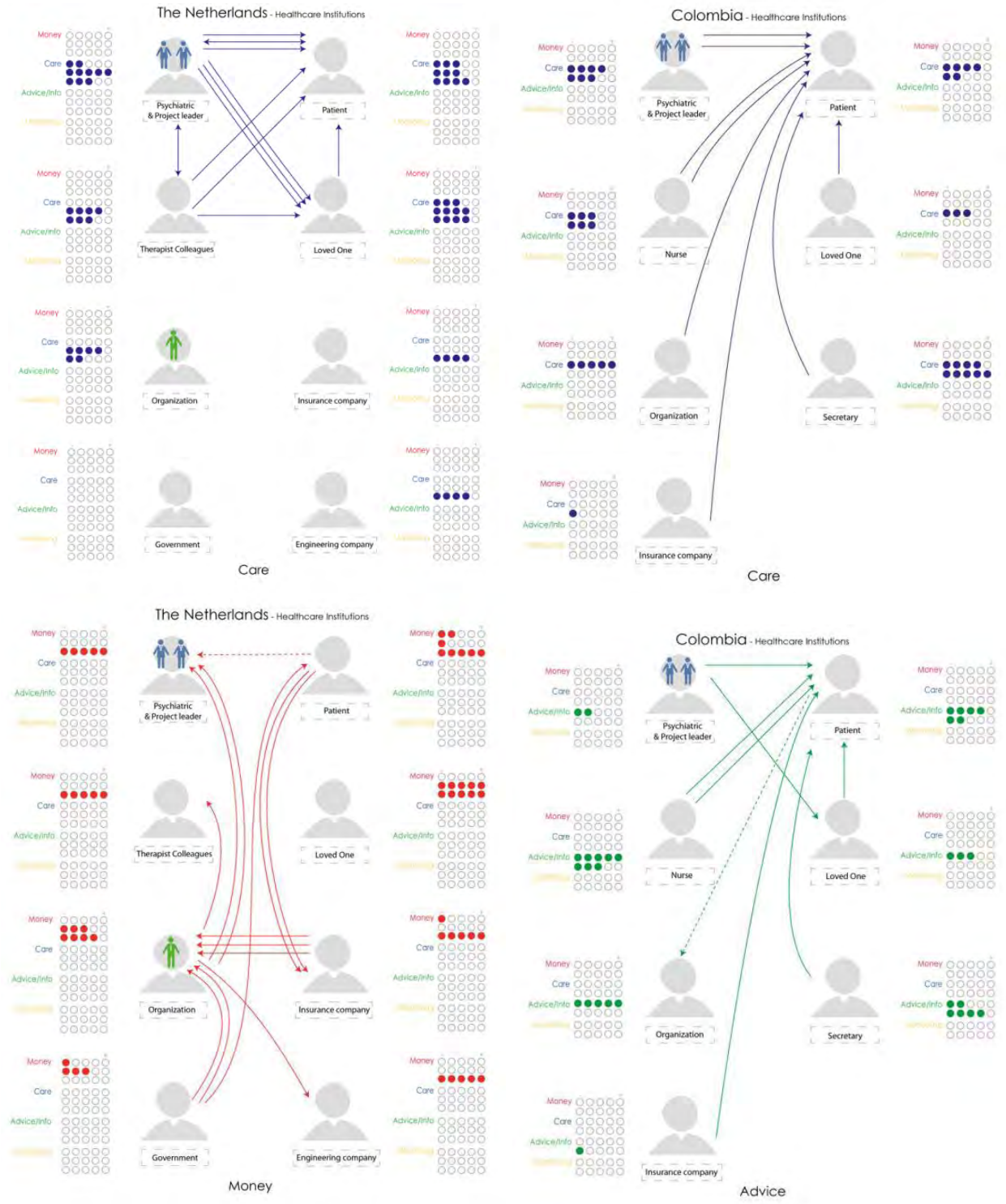

Figure 3: Net transaction model map (Nino & Ruiz, 2012).

DESIGN OF TRANSACTIONS

A new designerly tool was devised by combining the Human Centred Design toolkit (2012) and the Net-Map tool (Schiffer & Hauck, 2010) used in field studies. The purpose of our net transaction map tool is to identify relations amongst actors, and derived possible new services and ways to deliver those. From the HDC toolkit we selected the desirability “Lenses”, which aim to identify “what people want”, and the “community driven discovery” lens identifying stakeholders in a network or community, as key holders of insights and clues for system solutions. From the Net-Map

tool we took the interview-based method to visually capture connections, monitor and evaluate situations with many stakeholders' influences‟ and outcomes. This tool is based on defining roles of influencers, stakeholders, and moreover to address the network situation of HOW and WHY stakeholders are linked. We adopted several steps to guide the tool. We prepared two specific templates in advance that could also be used on an Ipad. One for patients and informal care giver (Familiar-Loved one) and one for a formal care giver (Specialist, Therapist, Nurse).

To start the net transaction mapping we provided the interviewees with the templates an additional instructions sheet and four colour makers. Then we invited the participant to: 1. Identify and name main actors, 2. Create and draw link relations with arrows of different colours, 3. Note degree of satisfaction or investment with the service you are receiving by ‘colouring the dots’.

From the individual datasheets we developed a disaggregated visualization, which was grouped so that it could be contrasted between the formal and informal caregivers in The Netherlands and in Colombia. The transaction mapping was visualized separately and the relations and the level of satisfaction or investment were grouped by type of relation among the different groups as seen in figure 3. The amount of arrows repeated between stakeholders‟ shows a stronger relation. The arrowhead points the receiver in the relation, which can be both sided and dotted lines shows a weak or missing relation perceived by the respondents. The level of satisfaction or investment was measured and translated into percentages to support the visual analysis, which is synthesized in figure #.

For the Netherlands the care service map presents a service in a network of relations in a tighten configuration of reciprocal relations between the actors. The service map of care for Columbia shows more disconnection, as all arrows exchange relations of care service point at the patient. This creates a non-reciprocal and passive assumption with regard to the patient contribution with regard to the relation and the service. See figure #. Care in Colombia is perceived as neutral to satisfactory, with the main stakeholders‟ satisfaction level in 60% and below. Mental health care services in the Netherlands are perceived as satisfactory, with levels of satisfaction above 67%.

Money is an issue in both countries. Parties involved stated the mental health service is expensive and they are not willing to pay extra money or simply they do not have extra money to invest in e-health. Currently the money aspect is taken care of by the health insurance. In the Netherlands the government is involved with subsidies. The profit formula is less clear in The Netherlands, where money relations cross in different directions that are not entirely repeated among participants, whereas in Colombia the money flow is clearer but also extra money is paid directly to the organization for better or extra services. See figure #.

Advice is covered from all the stakeholders in relation with the patient (green double headed arrows). Advice is not only provided by the specialist to the patient, but it is an asset that can and should be provided from any of the stakeholders involved in the network; this understanding their condition and level of advice to be offered. For instance patients believe that they hold valuable advice regarding their medical needs, and want to be empowered to share those widely. Currently there is a weak advice relation within the insurance company and the patient, where patients feel that insurance companies are not delivering a clear support about the alternatives and regulations of the services. Advice must flow along the entire network (green dotted circle), in order to reach effectiveness with the available resources and be tuned in the same direction. This flow of information is actually weak and could be enhanced by setting common and transparent goals within a clear business model concept. eHealth business models strengthen, increase and leverage the flow of advice and information among the stakeholders.

MAPPING 4: BUSINESS MODEL DESIGN FOR HEARTH FAILURE PATIENTS_ @HEALTH & WELLBEING COMPANY

SOCIAL CONTEXT

Heart failure (HF) is one of the major diseases in West-Europe with prevalence between 1-2%. From the exploratory research we learned that between 47-70% of all healthcare costs for HF are due to hospitalisation including readmissions. Telemonitoring is focussed to keep patients out of the hospital and avoid readmission and therefore could cut back on the largest cost for HF disease management. Real business models including term such as value proposition, profit formula, key resources and key processes are non-existent, yet.

DESIGN CHALLENGE

The design challenge in this case study is to investigate the 'service design' of heart failure management. HF disease management is a complex subject involving several stakeholders including the HF patient, GPs, GP assistants, specialists (cardiologists) and HF nurses. Also involved are hospitals, municipalities and relatives. The second design challenge is to gather insights into the daily practice of HF disease management.

DESIGN OF TRANSACTIONS

The value transaction mapping tool that we designed in this case is inspired by the book 'This is Service Design' (Stickdon & Schneider, 2010) in combination with the 'IDEO Human Centred Design Toolkit'. The activity mapping tools for creating a context map and personal journey are adjusted to the transaction element of a business model. The purpose of our value transaction map tool is to communicate roles and transaction relations. For this type of mapping we prepared a set of actors' cards and a concentric context map with the HF-patient in the middle. Actors are either represented with an infographic of a person or a building, representing an organisation as actor. In our case these cards represent actors in HF disease management. The set includes cards representing the HF patient, relatives, GPs, GP assistants, specialists and HF nurses. Furthermore the organisation actors' cards represent insurers, the government, municipalities and employees. In addition the set includes blanco cards for additional actors that are mentioned in the conversation.

This value transaction mapping tool starts with a blanco A3 paper, colour markers and a set of actor cards and the concentric stakeholders map. The interviewee is invited to map the actors and the transactions by drawing relations of: care providing, emotional relation, financial flow and other influence or relations of providing information and advice.

Different actors were invited to create visual maps and diagrams: asking patients, relatives, GPs, specialists and HF nurses

Drawn from the raw data maps eHealth service scenarios were mapped. In our case the first scenario presents telemonitoring treatment provided mainly by the hospital: the HF nurse and the cardiologist, yet there are also other specialists involved such as the digestive diseases specialist and nephrologist. The second scenario is one in which the practice nurse and GP are mainly responsible for delivering the necessary care to the patient. The third scenario mapped is the final phase of home care assistance or moving to a nursing home. This last phase in HF disease management is focussed on controlling symptoms and containing as much as possible the quality of life. Care is focussed on the patient and making his days as bearable as possible. Then there is no more focus on the numbers, tests and graphs.

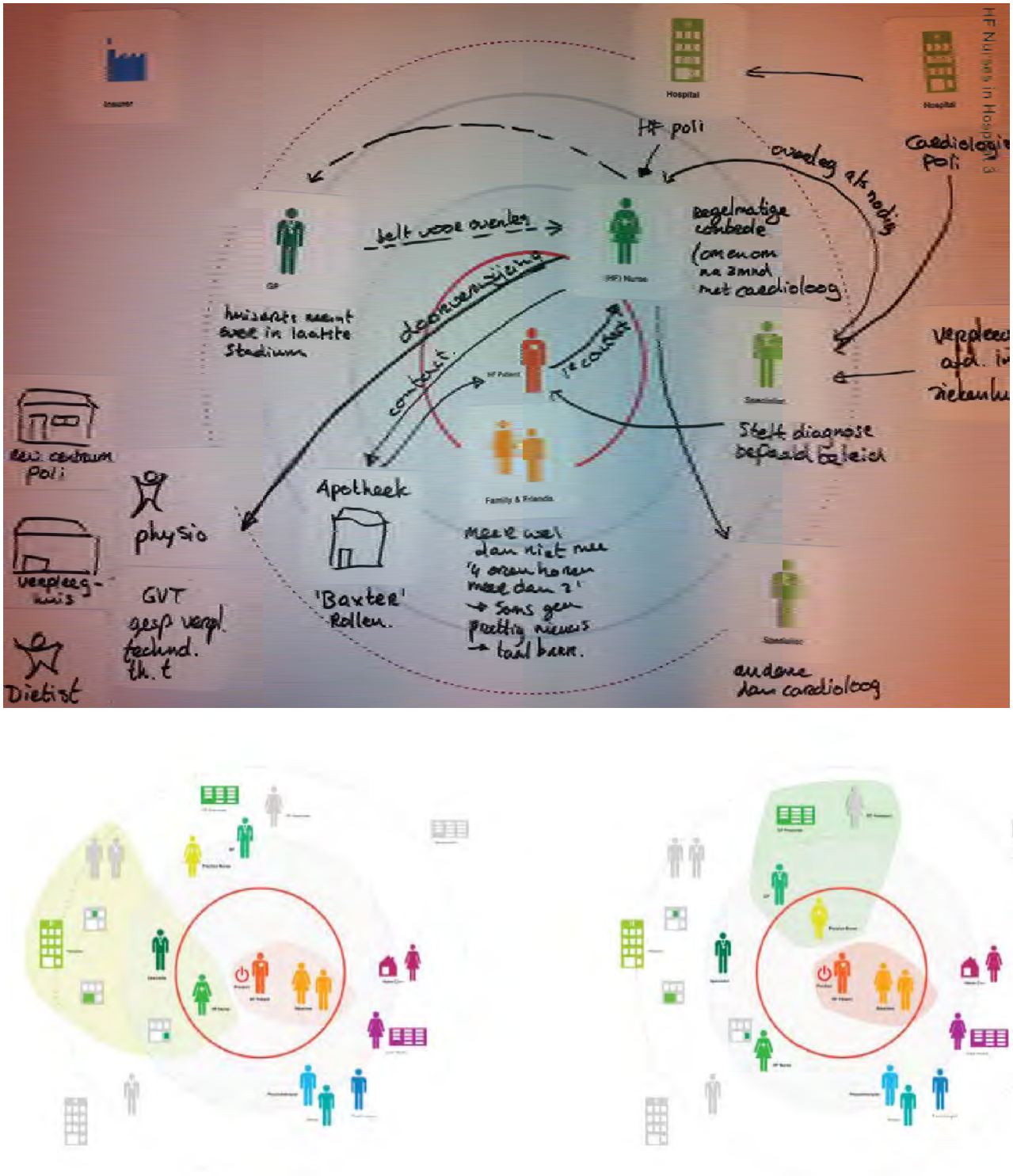

Figure 4: Scenario's for telemonitoring business model owners in the Netherlands (Griffioen, 2012).

DESIGN OF TRANSACTIONS IN ARTEFACTS

In our cases we experimented with four types of mapping methods. From free format hand drawing mapping to value transaction mapping (see table 3). We adopted one method from social construction studies (Human Geography), the Net-Map and adjusted in combination with the human centred design toolkit this to a net transaction tool. For strategic designers, analysis and design are reciprocal activities, and the mapping of a current business model provides a base for redesigning this into a future business model. In the context of eHealth, a number of ICT elements are added. Three other maps are inspired on designerly methods such as flow charts, context maps, activity maps and service blue print. The latter was used without further adaptation apart from a few money flow arrows. The free format drawing and the value transaction map are established through new combinations and particular development of business model elements into the map. Both maps relate actors and transactions of value propositions and cash flows, and more. In the free format drawings also transportation and product elements are drawn. In the value transaction map emotional links and information and advice relations are added.

Table 3: Overview of mapping methods for business model design

Cases	Mapping method	Actors objects	Transaction Design	Co-design ease of use	Visual quality clarity of result
Telecom foundation NL (Vis, 2012)	Free-format hand drawing	Hand drawing of logo's, Customer, and value chain elements like Distribution centre, Store. Telecom org. and Dedicated software provides represented by Logo's. Customer Retail shop Distribution hub	Four types: -Service proposition elements: mobile phones, software package, box package, manual etc.: -Money flows -Information flows -Transportation flows.	Medium Designer draws input form two partners Designer draw s detailed input form experts for reality check with experts Extreme flexible and time effective.	Medium Sketches are meaningful for the actors involved but are not self-explanatory.
Homecare provides NL (Crossley Urrego & Soto Camacho, 2012)	Service Blue print *standardized format.*	By keywords the names of the actors can be added.	Money flows are added	- N.a.	Low An abstract matrix or canvas provides the structure for a high level service process
Mental Healthcare institutes in Columbia and NL (Nino & Ruiz, 2012)	Net transaction tool	Prefab actor icon ("puppets") on template and infographics dedicated to eHealth network of formal and informal caregivers.	Hand drawn of four types: -Care Service -Money -Advice/Info -Monitoring	Low Arrows in single prefab template becomes too messy and complex.	Medium Separate analysis views per transaction provide more overview but lack interactions views.
Health & Wellbeing company (Griffioen, 2012)	Value transaction map	Cards with infographics of people and buildings dedicated to HF disease-management	Hand drawn of four types of transaction - care providing - emotional relation - financial flow - influence relations of information and advice.	High Effective in modelling a value network efficient in time Reusable other types of patient journey map.	Medium Demarcation of business model domain is clear but the abstract level of this context is too high for modelling the value proposition.

In table 3 the mapping methods are classified according to designing actor objects and transactions, and their quality for ease of use in co-design and visual quality of the result.

The *Free format hand drawing* method we qualified with a medium ease of use in co-design because the participants in this case did not draw themselves. The strategic designer draws the

scenario's that are told by the participants in the meetings. Furthermore, because the model is made by hand this doesn't preoccupy the participants and supports the orientation and exploration nature of the meeting. Furthermore, the business model is not already 'fixed'. On the contrary, the hand drawing method is extremely flexible, typical elements are draws depending on what 'pops up' in the conversation. Also the drawing of business model scenarios is time effective. In this case business model sketches were incrementally redrawn until a last simplified end result. However, for an outsider the clarity is harder to grasp. The visual quality of these results we qualify as medium.

The *Service blue print* method that basically is a matrix or canvas provides the structure for a high level service process. Key words need to describe the transaction and actors can be added with their names. This method is not very suitable for designing transactions and visual explanation.

The experiment with the *Net transaction tool* surprised in its complexity. The strategic designers were overwhelmed by the messy of all four transactions in a single template. In the analysis stage of the mapping method the transparency was increased by separating for each type of transaction a view. Overall, we qualify the ease of use of one template low and the visual quality medium.

The *Value transaction map* appeared to be more flexible through making cards for the actors. These cards could also be used for a customer journey map. For the business modelling in this case the transactions were hand drawn. By use of semi-structured interviews and the value transaction mapping tools, the executing of the exploration research, was experienced as highly efficient and effective. The mapping tools proved focus and lead to direct results. We qualified the ease of use of the tool in co-design high and the visual clarity of the results is also medium. The result is provided on the abstract level of a context map that is too high for modelling the transactions in a business model.

To conclude, the best business model mapping tool needs still to be developed.

We provide these examples of designerly approaches to inspire for more experiments and practising with mapping methods for business model design. Most of all, there is visual room for improvement.

IMPLICATIONS FOR THEORY AND PRACTICE

By 2040, The Netherlands will have 4.5 million inhabitants older than 65 years. Many of them are active participants within their communities, as evidenced by their involvement in (voluntary work) and informal care provision they carry out. Their healthy life expectancy and favourable socio economic position opens the way to a relatively long social life. For these elderly living at home, accessible local care plays a part in helping them to be independent and direct their care processes for as long as possible. Managerial implications of our research findings concerns contribution to:

A. Initiate Design-led project on business model design for new services.

B. Use case examples as inspiration for these projects. Contributing to the body of knowledge of design theory, on the particular theme of designing business models:

A. with visualized business model maps

B. design-led method of mapping Exchanging views with the international scholarly community and advance the state of the art in design management research, theory, and practice on design models.

CONCLUSION

Strategic product designers have the ability to contribute to the solution of business models because of their attitude towards product-human interaction and in services, the human-human interaction. By using, and adequately adapting business model concepts from corporate strategy

we took the lead in designing business models In five experiments in eHealth and built upon our capabilities and invent methods and tools for creating business models in a designerly way.

With our attitude of exploring and framing problems, we got introduced to business model concept definition and identified a gap in modeling new business model designs. In five experiments we took the lead in designing business models and built upon our capabilities and invent methods and tools for creating business models in a designerly way.

This paper offers some insight about the design contribution in modelling new business models from these experimental cases. We provide these examples of designerly approaches to inspire for more experiments and practicing with mapping methods for business model design. More research in design can contribute in crafting an optimal tool for designing transactions between actors in new business model designs.

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Cruickshank, L. Whitham, R., And Morris, L. (2012). *Innovation Through the Design of Knowledge Exchange and The Design of Knowledge Exchange Design.*

INNOVATION THROUGH THE DESIGN OF KNOWLEDGE EXCHANGE AND THE DESIGN OF KNOWLEDGE EXCHANGE DESIGN

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In this paper we describe our research and its application to the design of knowledge exchange (KE) involving over 200 companies, ranging from micro businesses up to large multinationals, such as the BBC, Arup, and IBM. We discuss KE process design as a form of interaction design and go on to propose a new 'second order' approach to KE design, enabling others to design their own KE approaches based on a framework of tools and methods. This is explored through the idea of a KE design toolkit that provides resources and support for designing KE processes. The design of toolkits is as a KE problem itself requiring that users of the toolkit engage with the KE problems they are trying to solve.

This has implications for company innovation and the role of design and design thinking in innovation processes, particularly in the areas of open design and innovation. We also draw out some important implications for the design profession as a whole.

Keywords: Knowledge Exchange; Interaction Design, Toolkits

INTRODUCTION

Knowledge Exchange (KE) is not a term we often use in everyday conversation, but it is a key component of any collaborative, productive or creative process involving more than one person. Every productive workshop you have attended, every good meeting, creative conversation or even an interesting Twitter exchange is an example of good knowledge exchange. Generally KE is often the result of processes and mechanisms that are not well understood or examined. Who has not taken part in a brainstorming session, but what small percentage of these people know this approach was designed and developed in 1952 by Alex Osbourn (Osbourn1952)?

In the research presented in this paper we design and test new approaches and activities that promote innovation and creativity. KE research draws on a diverse range of theory and practice including interaction design, social network theory, innovation studies and graphic design.

This represents an important move away from both traditional knowledge transfer (clever people in universities telling companies what they should do) and consultation based design (using people as data banks for clever designers to exploit). KE is an approach in which everyone with an interest has something productive and creative to offer, if challenges can be framed in a way that is appropriate for the parties involved. This places KE in a strong corresponding relationship with participatory (Luck 2007), open and co-design approaches (Abel, B. van et al., 2011) in addition to a more general relationship to Open Innovation (Chesbrough, H., Vanhaverbeke, W. & West, 2008).

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We are interested in the explicit and considered design of KE mechanisms and processes. Our work explores the role of structure in collaborative activities and the tools, which can be used to design them. We see the design of KE as a type of interaction design in which human to human interactions are designed. This interaction could be without any mediating technology or media; for example we have worked with people exploring problem solving through body movement and choreography undertaken in silence. More often we employ designed products that enable the interaction. In many cases these will be physical cards, pro formas and objects. We have found that as the barriers to use of digital technology are lowered interaction can increasingly be facilitated by digital systems and products.

Within this KE design space, we use two complimentary approaches to the design of KE and in a nod to Richard Buchanan we term these first and second order KE design. The philosophical position that underpins these activities is broadly post-structuralist in character and is exemplified by openness, non-hierarchical engagement, multiple authorship and risk friendliness that permeates all our KE work in one aspect or another.

METHODOLOGY

Through our work with both large corporate partners and with (mostly creative industries and high technology) small and medium enterprises we have adopted an action research approach. The iterative nature of this method suits the design prototyping and testing approach taken in the project as does the opportunity for dual outcomes: most of our companies want to enhance their innovative potential, not do academic research. We go beyond conventional action research approaches through the extension of ideas first proposed by Carolan and Cruickshank (2011) where toolkits themselves can act as a more effective alternative to cultural probe approaches pioneered as an alternative to the conventional approaches of Bill Gaver (1999).

FIRST ORDER KE DESIGN

First order KE design produces mechanisms, tools or approaches that promote the sharing of ideas, results, expertise or skills between people. The outcome of this design process is typically a workshop-like event or series of events, with a fixed location and physically co-present participants. The role of KE design in such events is to formulate and then implement a structured process that makes the most of the knowledge, experience and creativity of the participants. In this respect, it is related to creative facilitation: methods by which groups of people are brought together to solve problems. Often a KE process will bring together individuals from different organisations and backgrounds to look at a problem. This could be something broad like the Future of TV or how to manage creative design departments that are distributed around the world to more specific problems such as the development of a particular city space.

Our approach to first order KE design brings together a number of disciplines including interaction design, graphic design, cognitive psychology and innovation studies. Core to the approach we take is the understanding that for a designed KE process to be successful, it must be specialised to the needs of the participants who will undertake it. For the designer of such a process this means understanding the perspectives of the participants and the problem spaces they operate within.

The role of the KE designer is to understand the perspectives and approaches of those involved and provide a structure that enables the interaction between participants to meet the agreed aims and objectives of the event. There are 2 different scales of design intervention in first order KE.

- **Tools:** These are very specific actions and techniques that are the smallest components of the design of an event, they have very specific functions such as exposing the assumptions participants have brought with them, moving participants around a space or documenting ideas.

- **Mechanisms:** These are collections of tools working together to enable and overarching aim to be achieved. This could be a 'workshop' like activity but could also span across a number of events and activities.

Across the range of tools and mechanisms developed, as part of this research there is a great deal of variety. Often tools can be very simple, specific activities with a closely defined function. An example of this simplicity is the fruit-sticker tool. One of the common requirements in workshop design is to split people into groups. Sometimes it is beneficial for participants to form their own groups, but sometimes more control is needed. Fruit-stickers provide this control when required.

Very simply on arrival participants are given a sticker with a fruit printed on it, this corresponds to bowls of fruit in the event space. When the time comes it is easy for participants to know what group they are in. Of course any label could be used for this approach, but fruit has significant but subtle advantages for the experience of the participants in comparison to numbers or letters for groups: The scent of the fruit keeps the air fresh in the room, it also provides a ready supply of high energy, slow release nourishment for when energy levels dip. This experiential approach where all elements of the environment are open for modification help the subconscious engagement as well as explicit interventions.

We talk about an experiential approach to interaction design where small details: the thickness of the paper, the smell of a room, the quality of light, all have a disproportionately large effect on the outcomes of an activity. An extreme example of this can be seen in a workshop undertaken for the BBC (British Broadcasting Corporation) to develop strategic new projects crossing between departments. This involved the development of 20 or so concepts that had to be paired down to 5 or 6 that would receive funding and other resources. With a mix of very senior and relatively junior BBC staff present the danger was that the outcome was dictated by politics and seniority rather than the best ideas. To circumvent this a new tool was developed. The ideas were mounted on a wall and each participant was given a card with stickers on, black for no and red for yes. We used green lights in the venue during this activity making it impossible to differentiate between red and black. Under these conditions people were able to freely use the stickers to vote both anonymously and publically. This also had the benefit of increasing the tension (and fun) when normal lighting was reintroduced and the results became instantly visible.

These simple and (once they are described) obvious tools are counterbalanced by some mechanisms that are highly complex involving weeks of software development and technical infrastructure. This could involve the creation, manipulation and visualisation of a set of data with multiple spatially separate groups working on the same information in real time.

At a more general level, a KE designer might see the need for a divergent ideation process during a workshop. Many important design decisions then need to be made, such as, what question(s) will drive the process, how large should the groups be, how long will the activity run for and how should the ideas be recorded? All of these decisions will have a substantial effect on the outcome of the activity and the experience of the participants who take part in it. Our approach is to make these design decisions explicit and explore the effect they have on the KE process.

This first order approach is exemplified by two projects, IDEAS at Daresbury in 2009 and Creative IDEAS in 2010, where co-creational approaches directly facilitated exchange between diverse groups of businesses, organizations and academia (Cruickshank et al, 2011).

Here follow up interviews indicated that the IDEAS at Daresbury project had significant positive impacts on their business (Fogg et al 2010). During the specially developed social network mapping exercises, including our tool NETS, the participants were able to see connections in their network and target this at solving a specific business problem (Mortati and Cruickshank 2012) furthermore, the feedback from the stakeholders in the Creative IDEAS project confirms that the events generated impact for the stakeholders; opening their eyes to knowledge exchange, changing their future strategies and linking together disciplines.

SECOND ORDER KE DESIGN

In second order KE design, our understanding of the design of workshop-like activities is complimented by a new and still emergent research question: What is required for people to design their own KE tools and mechanisms? While our philosophical position is implicit in our own first order KE design work, the second half of this paper explores how best to facilitate good KE design in others. For example, our research has shown the need for an approach tailored to the specific needs and context of activity, and for a willingness to be innovative and take risks. A simple recipe for others to follow would run counter to our experience. Tools and prescribed mechanisms alone are not enough to ensure good KE design; we want to help others create specialised mechanisms that address the problem spaces they face. We want to help people design their own KE mechanisms and approaches.

There are, of course, many toolkits that have already been developed for multiple applications such as Creative Whack Pack (Von Oech, 1992; Von Oech, 2009) and Oblique Strategies (Taylor 2003); for inspiration or idea generation, IDEO Method Cards for user centered research (IDEO, 2003) and Business Survival Toolkit for SME development (Creative and Cultural Skills, 2012), as well as Ketso (Ketso, 2010; Tippett and Connelly, 2011), Drivers of Change Cards (Luebkeman 2009) and IDEAS Factory for general group engagement. Ketso, developed by Dr. Joanne Tippet is an example of a 'toolkit for creative engagement', which helps 'overcome initial communication difficulties' in diverse groups (Tippett and Connelly, 2011, p.30), which was originally developed for community engagement for spatial regeneration (Ketso, 2011). For the most part we do not categorize these as truly second order approaches as they are about applying a technique rather than developing new approaches that fit the particular capabilities and needs of the specific context in which the tools and mechanisms will be deployed.

One of the few good examples of second order toolkits includes Delft University of Technology's Creative Facilitation course that equips students with the knowledge of designing and leading creative processes in teams (Tassoul, 2009). This is a clear example of second order KE design as the taught content of the course cannot and does not address the particular problem spaces it's alumni will work within; instead it provides a broad approach that can be brought to bear on any problem.

A more playful example of a second order toolkit is cars produced by i.am.auto, as part of musician will.i.am's venture (Cruickshank, 2012; RCA, 2012). The cars will be used as a mechanism for people living in East Los Angeles to learn how to repair car electronics and generate job opportunities. Here the tool is actually an attractor and representation of the cache the music group the Black Eyed Peas have. The mechanism draws disadvantaged people into a learning environment that uses the car as a test bed for KE around maintenance and repair of relatively new cars.

DESIGNING TOOLKITS

Our current research is focusing on second order tools and mechanisms. These are approaches that are designed to help people design their own tools and approaches for KE. The key here is that it's about developing a creative design process that facilitates the design of new approaches by people who are new to creating these sorts of processes.

The problem of creating a good toolkit for designing KE processes is itself a KE design problem. Our first order KE design research and practice has led to a number of tools, techniques and principles which we think make for good KE design. Making this knowledge available to others is made problematic by our belief that for a KE process to be effective, it must be specialised to the context in which it will function. As a result we can only provide 'fuzzy' tools that must be brought into focus in order for them to be used most successfully. We can also provide exemplar processes that illustrate how the tools have been used in different contexts and how they have evolved over time. Figure 1 shows many of the tools we have developed and how they have been combined and shaped each time they are used. Each particular KE design (workshops in the case of Figure 1)

draws on many tools. Each tool is the sum of all these different ways it has been used in many distinct KE processes.

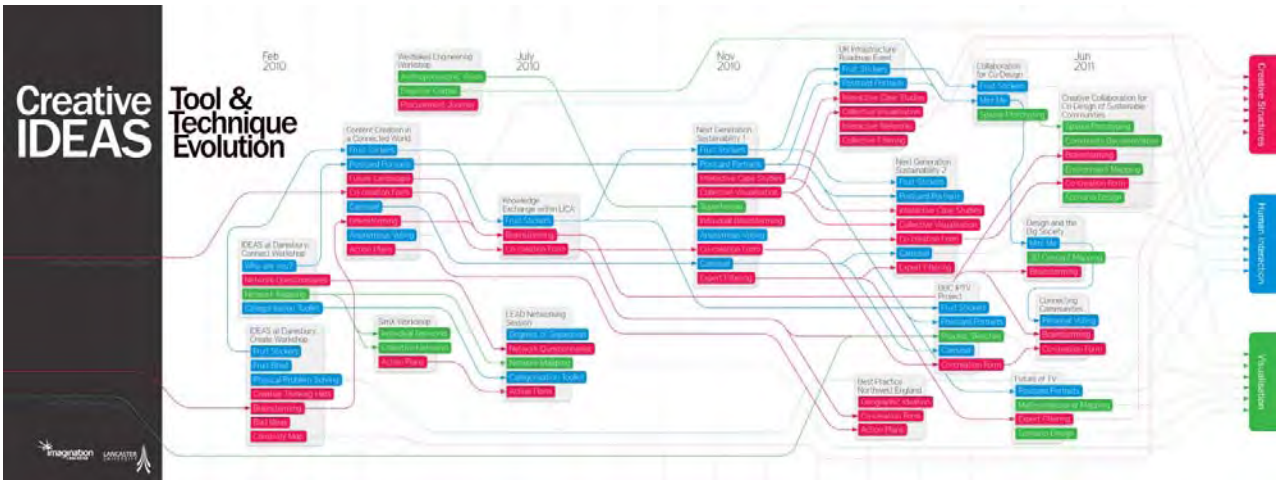

Figure 1 Map of tool and technique evolution throughout the Creative IDEAS project (2010)

Tracking how we have used our own first order KE tools is useful for our own research, but this information alone does not constitute a KE design toolkit. The Creative IDEAS project designed and implemented KE processes in a wide range of problem spaces, from local secondary education to national infrastructure policy. This breadth makes for a good level of variety in the exemplar KE processes we have available, but it does not capture the tacit design decision-making we undertook in our design practice.

Making the leap to proper KE design toolkits is the subject of our current research project New IDEAS. Our focus is on multiple toolkits rather than a single, monolithic one-size-fits-all approach. We believe that good second order KE design requires some of the specialisation found in good first order KE design. An example of this is the NETS toolkit we created to help a group of academics identify and engage with valuable people inside and outside of their organisation.

The NETS toolkit centred on a KE mechanism developed for the IDEAS at Daresbury project, represented in Figure 2. As originally implemented, owner-managers of high-technology small to medium Enterprises (SMEs) were taken through a process to visualise their network of contacts. The aim of this was to get the companies thinking proactively about shaping and using their networks rather than seeing networking as an endless process of collecting business cards or Linkedin connections.

The overall task was broken down into multiple steps, which resulted in a visualisation of each participant's network of contacts and a set of quantitative data about the network, including spatial distance between members and frequency of contact. This information was processed and fed back to participants in a bespoke report with an analysis of their individual network and advice for growing it.

The process was informed by social network theory. This is increasingly recognised as an important component in the propagation of innovation. This is only superficially connected with digital networks (Linkedin, Facebook and so on) rather it is a recognition that innovation is increasingly seen as a systemic process that needs more than traditional collaboration mechanisms (Fagerberg, 2005; Ming-Huei Chen and Hung, 2008; Pavitt, 2005; Powell and Gordal, 2005). Concepts such as communities of practice (Wenger, 1998), networks of innovation (Brown and Duguid, 2001) and Collective Invention (Allen 1983) and of course Open Innovation (Chesbrough, 2002, 2003, H. Chesbrough Crowther, June 2006) underline the importance of the transfer and/or exchange of knowledge. The NETS approach exploited this research to help propagate innovation in companies. In particular we used the ideas of Roland Burt and structural

holes (1992), we also looked at the qualities of networks in social networks using the strength of the ties in networks an approach pioneered by Mark Granovoetter (1973).

We did not mention this academic research on innovation and social networks directly with the companies involved in the project. Instead we developed a mechanism and set of tools that they used in an intuitive way to visualise a component of their network in a range of ways. We then used these visualisations and the data encoded in them to provide participants with insight on their networks directly in the event. We also worked with Management academics to undertake a formal network analysis and at a later date gave each participant an easy to understand analysis of their networks. This process is described in more detail in Fig. 2.

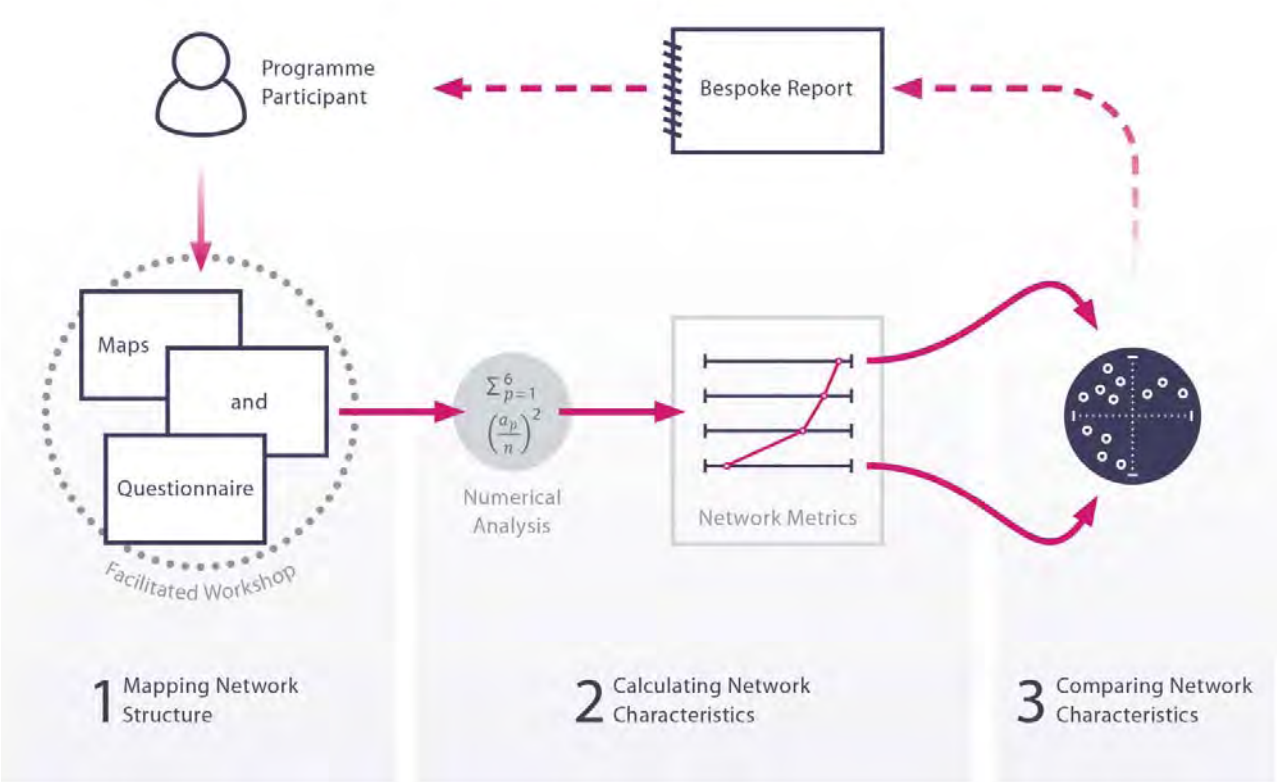

Figure 2 IDEAS at Daresbury, NETS KE Process

Some time after the first development of the NETS project we were invited to think about how it might be used as the basis of a toolkit for others to use the NETS concept. In creating the NETS toolkit, the first order KE design work undertaken during the IDEAS at Daresbury project needed to be structured and made available for modification. The toolkit also needed to invite and encourage users of the toolkit to be creative and change the way the process functioned. We did this by breaking the process down into a series of steps, each with a specific implementation. This provided a low barrier to using the toolkit in its most minimal application; following the steps in order would be sufficient to implement a basic KE process. In addition to the process steps, we also provided a higher-level description of the KE objectives at each step and a KE design rationale for the prescribed process. This second order structure is intended to allow the underlying function of each process step to separate from the specific implementation described in the toolkit. Figure 3 shows three of the cards included in the toolkit.

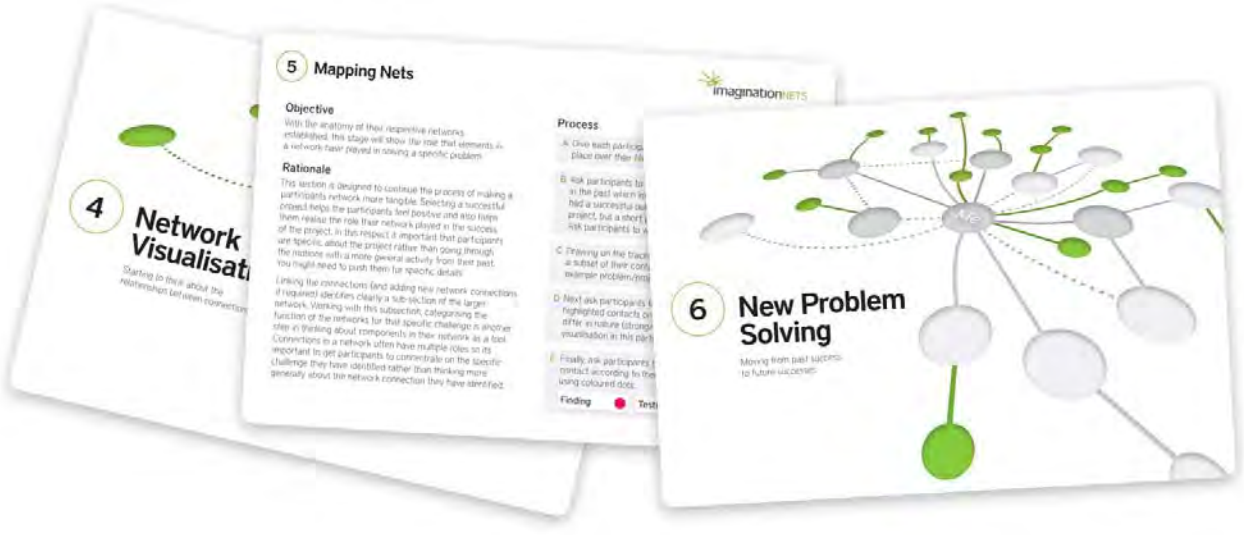

Figure 3 NETS toolkit cards

The steps within the NETS toolkit also vary in rigidity with one another. Some steps are highly prescriptive, providing firm points through which the KE process should pass (for example, having participants create lists of their contacts), while other steps require that the user of the toolkit thinks about who will make use of the mechanism. An example of this is the second step of the toolkit, which calls for a 'warm up' activity with participants, but does not specify what this should be. Instead it explains why the activity is needed and what role it should play in the overall process; users of toolkit must then make their own first order KE design decisions about what to do.

From our on-going work in this area a good KE design toolkit should:

- Provide 'fuzzy' tools which provide immediate basic functionality, but which reward modification and specialisation
- Include a useable prescribed (exemplar) KE process to allow toolkit users to try it out
- Encourage departures from prescribed structures and implementations by providing the rationale for design decisions
- Require different degrees of departure from the prescribed structure at different stages to engender experimentation

IMPLICATIONS FOR THEORY AND PRACTICE

While there are many consultants developing and delivering KE activities and tools, there are few designers active in this space who are consciously designing KE approaches and even less research on the design of KE tools and mechanisms. The literature on the design of KE (rather than the application of approaches such as Creative Problem Solving (CPS) or other management ideas) is still very much embryonic, as academics are often not involved in engagement projects that use them.

There is an urgent need to stimulate more research and discussion in this area because design thinking is becoming absorbed into business culture both through popular writing by authors such as Chris Brown and Roger Martin. Evidence suggests that to really get people exploiting the power of design thinking they need to apply this understanding. Similarly the drive towards understanding the impact of research, especially in the UK, is making the understanding and maximising of exchange between universities and external agencies very important.

Underpinning all this is a theoretical imperative to develop new forms of creativity and innovation that have a more nuanced understanding of design and designing in which they are part of an ecology of innovation rather than in an uncomfortable box between R&D and Marketing. This

requires new types of innovative people and new processes and approaches to maximize this more interconnected approach.

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De Lille, Christine; Roscam Abbing, Erik and Kleinsmann, Maaike (2012). *A Designerly approach to enable organizations to deliver Product-Service Systems*.

A DESIGNERLY APPROACH TO ENABLE ORGANIZATIONS TO DELIVER PRODUCT-SERVICE SYSTEMS

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Design is not only just for products, logo's or websites anymore. More and more companies are embracing design as a way to enable their organization to adapt to changes in society. One of the challenges many organizations face at the moment is how to create value for their customers by delivering experiences. One of the ways to do this is to develop services to complement the service offering. These so-called product-service systems need to be designed just like products, logo's and websites. Their development requires a designerly approach in order to make them valuable for the company and the customer. But how can this designerly approach actually enable organizations to become better at delivering Product-Service Systems? And what is the role of design consultants in embedding this designerly approach in organizations? Does the application of Design Thinking play a role in this? And can they support organizations to adopt Design Thinking?
Design consultants are able to compare the practice of different companies and are on the cutting edge of the field. This article is built upon a series of interviews with different consultants, to arrive at suggestions for professionals that wish to shift from a traditional product-centered approach towards delivering Product-Service Systems.

Keywords: design thinking, design consultant, product-service systems

A CHANGING WORLD

In the last century, the introduction of technology has changed our lives drastically. Technology provided us with the possibility to live in comfortable houses, to travel and to communicate with each other in various ways. Technology also provided us with consumable products that enriched our lives. However, over the last decade, our materially oriented economy has been in transition towards an experience economy in which experiences are more important in the eyes of customers than products and technology as such. This implies that in order to generate true value for people innovations will have to entail an experience element on top of the product offering. Vargo & Lusch (2008) suggest that companies that adopt a goods-dominant logic insufficiently realize the need for delivering value instead of goods. They pose that the best way to deliver value is to adopt a Service Dominant logic that helps company's co-create this value with users. This requires a change in the organizational mind-set, as well as an integral approach to innovation of products and their encompassing services, so-called Product-Service systems (PSS).

PRODUCT-SERVICE SYSTEMS

Both New Product Development (NPD) and New Service Development (NSD) have been well documented, the former from a product design perspective, the latter from a management

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perspective. NPD and NSD come together in Product-Service-Systems, and here we are still somewhat in the dark. Product-Service Systems can be regarded as *"tangible products and intangible services designed and combined so that they jointly are capable of fulfilling specific customer needs"* (Tukker 2004).

Not only intangibles are an essential part of services. Johne and Storey (1998) indicate two more differences between NSD and NPD: heterogeneity (the various channels, touchpoints, systems, business models and resources that play a role in service delivery) and simultaneity (the fact that in services 'production' and consumption occur simultaneously). Designers have to take into account this intangibility, simultaneity and heterogeneity when designing for PSS and that is not an easy task. Similarly, enabling organizations to deliver PSSs is quite complex, since it involves multiple stakeholders, departments and support systems, thereby typically having a larger impact on the organization than classic NPD projects.

COLLABORATION IN DEVELOPING PSS

The development of Product-Service Systems requires a far-reaching integration of different knowledge domains from different stakeholders. This collaboration is difficult, because stakeholders have different interests and perspectives on the PSS (Bucciarelli, 1996; Dougherty, 1992). Furthermore, it is demanding for companies to manage the stakeholders toward thinking along the same line since stakeholders face difficulties in interpreting and understanding each other's knowledge (Adams *et al.*, 1998; Dougherty, 1992). Stakeholders from different disciplines use different languages and different representations of the PSS. Kleinsmann *et al.* (2007) showed that knowledge processes between companies differ from those within one company. Collaboration does not only take place between the design consultant and the organization, also within the organization collaboration takes place between different people and different departments.

CHANGING AN ORGANIZATION

When an organization wants to create added value for their customers, it can decide to transform from NPD focused towards being more Product-Service Systems focused. This transformation poses quite some challenges. It requires a shift from product dominant logic toward service dominant logic. Organizations have to become more customer oriented and co-create a new kind of value by providing services. Not only does this change require a different mindset, it also requires changes in the organization, involving the entire company, the innovation process and often its business model. The radical change this entails is often facilitated by the support of external consultants. At the moment the authors witness a new kind of consultant is emerging in this field of expertise, namely consultants with a (product) design background. These design consultants have a specific set of skills and approaches that might be valuable in enabling organizations to deliver PSS.

A DESIGNERLY APPROACH

Traditional design skills, including imagination, creativity, innovation and value creation (Gloppen, 2009), have already proved to be of great value for supporting collaboration between different stakeholders in developing the Product-Service Systems of the information age. This way of using design is often referred to as Design Thinking. Design Thinking frames design not as a new aesthetic layer around existing products. Rather, it looks at the cognitive, attitudinal and methodological aspects of design as a way to facilitate organizational change.

MINDSET OF DESIGNERS

The added value of a designerly approach does not only lie in the aspects most people think of: visualizing, prototyping, creativity, and such. The real value of a designerly approach lies in the mindset of designers. Designers tend to see problems as opportunities for the invention of new

alternatives. They think more in terms of creating new possibilities than in terms of selecting between existing alternatives (Boland and Collopy, 2004). The very nature of design problems is that they are wicked problems (Buchanan, 1992). This makes design thinkers* able to deal with uncertainty, to take risks and to work in the fuzzy area of the design process. Design thinkers are people-persons, they have empathy for different stakeholders and have experience in dealing with people.

The one thing that seems to remain relatively stable, even in times of great change, is the need to understand human behavior. The exact thing Design thinkers are very good at. Therefore it's no surprise that increasingly, business managers look to the field of design to help them get in touch with their customers' (and other stakeholders') unarticulated needs and desires. When made a part of an organization's work processes and competencies, Design Thinking enables an organization to embrace change as a normal part of managing its business. (Coughlan and Prokopoff, 2006)**.**

HUMAN-CENTERED

The design thinkers' ability to empathize with multiple kinds of people and the skill to co-create enables collaboration to develop PSS. Empathic understanding goes beyond knowledge: when empathizing you do not judge, you 'relate to (the user) and understand the situations and why certain experiences are meaningful to these people, a relation that involves an emotional connection (Battarbee and Koskinen 2005). Empathic understanding can also be used when collaborating with different stakeholders. Using empathy, the design thinker can identify needs of the different stakeholders and react upon them. Through a complex and iterative process of synthesis and transformation of research data, design thinkers empathize with the stakeholders through revealing future design opportunities. Facilitating collaboration is a skill crucial in the skill set of design thinkers. Mattelmäki and Sleeswijk Visser (2011) state that in co-design the designers (or design researchers) typically facilitate the collaborative process but often also participate in the process as one of the contributors. The co-design activities typically aim at searching new potential directions and producing design ideas and solutions. However, they can also be about making sense of the topic or expressing experiences collaboratively. It is specifically in this direction that designers use their (visualization) skills in enabling stakeholders to express experiences and support them to make sense of the topic.

FUTURE-ORIENTED

Designers by the nature of their work are futurists. The least time it takes to produce a product and get it on the shelf is a couple of years. Sometimes it can be 10–15 years. So you're already dealing with the future when you sit at your desk in the morning. (Seymour, 2010) As nothing in the future has been decided upon, designers also need to deal with large amounts of uncertainty. This comes in handy when design thinkers work in processes of change. For an organization, it is difficult to deal with uncertainty. Design consultants can support an organization as they can draw on their own experiences. Design thinkers know how to adopt their way of work to the context and changes in their project. They do not have one way of working, each time they change their process according to the client's needs and situation. This enables design consultants to truly fit their client's needs.

WORKING VISUALLY

The skill of design thinkers that most people are aware of, is their ability to translate, visualize and communicate, what to others are fuzzy insights, to inspire the change process. Design thinkers are able to make insights usable, by making abstract matters tangible.

Design thinkers know how to translate data and insights identified through collaboration and insights gathered from stakeholders into a form that is useful within future- oriented design

* We refer to people who practice Design Thinking, one of the interviewed design consultancies is called Design*Thinkers.* Their name is spelled different to stress that we are referring to a company.

projects. This transformation of information involves the designer drawing upon his or her creative, intellectual and visualization skills and results in the translation of abstract concepts into concrete instances of potential futures (Evans 2011). Rapid visualization may give stakeholders a concrete image of the future solution that words alone could never convey (Utterback et al. 2006). This is not limited to sketching alone. Designers are used to work with rich information and creating different kinds of representations. As Schön (1983) puts it, designers interact with these representations in a conversational way. These representations are thus far from being incidental outputs but are rather central inputs in the thought process. Designers uncover unmet consumer needs, wants and desires and use these insights to inform future generation products and services.

EXPLORING "HOW" IN PRACTICE

Changing an organization completely towards PSS is an enormous challenge. Organizations do not take this endeavour lightly and often look for support. *That* Design Thinking can be of great value for organizations that wish to change is covered in many different books (ao Verganti 2009, Martin 2009 and Brown 2009,). Organizations see it as an opportunity to innovate better and change their organization to create value for their customers. But little is known of *how* Design Thinking is embedded in organizations in practice. Some authors try to provide elements as for example Liedtka and Ogilvie in their design thinking tool kit (2011). They give background information on the value of design and provide an overview of tools that can be used in 4 different phases towards growth. However, in our opinion the largest question still remains: how can these tools be implemented in practice? Design Thinking goes beyond applying tools. Rather, it is about building an organizational mindset. Design Thinkers often have educated themselves, based on their own hunger for more information, in an intuitive way. This process takes time, it cannot be taught with a tool kit. It can only be learned by acting and experiencing.

Unraveling the quest of an organization towards a designerly organization may help other organizations in their adventure. We will explore in this paper how design consultants in the Netherlands support organizations in embedding Design Thinking in their organization. By talking to them and by letting them explain how they have dealt with supporting organizations to change towards delivering Product-Service Systems, we will draw upon their experience to make suggestions for others interested. The seven interviews we held are a starting point for our investigation of how Design Thinking is applied in practice to enable organizations to change.

We hope to show organizations what kind of challenges they might face and how they can prepare themselves for this process of change. We also show that there are different kinds of design consultants, each having a different focus but trying to achieve the same. As for Science, we will not focus on proving the value of Design Thinking, but show how organizations are trying to use it to change their organization to deliver PSS. In the near future more interviews will be held internationally.

DESIGN CONSULTANTS

The design consultants we have interviewed have a leading position in the field of supporting companies to transform from NPD towards PSSD and are people with passion for their work. They are curious and go the extra mile to do valuable work. These consultants have a genuine interest in creating better organizations. They are 'people-persons'. None of the interviewed consultants is alike, each approaches changing organizations using design thinking from a different angle. Table 1 shows an overview of the seven design consultants we have interviewed. To illustrate in which perspectives they are different we have compared the consultants based on their background, which kind of stakeholders they primarily involve and which are the main points of focus in their work.

BACKGROUND

Some consultancies are built on the basis of teams, as for example with Design*Thinkers*, where people from different backgrounds strengthen each other. One comes from a design background where another has a business background. Other design consultants are primarily built on one background. Contextqueen is a solo-consultant often teaming up with other consultants, but coming from a strong design background. Booreiland, a two-partner firm, has its roots in designing media (either printed or web), so in the work they do, they rely on their media design background.

Table 1 overview of the interviewed design consultants

	Contextqueen	**Zilver Innovation**	**Eye-D**	**DesignThinkers**	**STBY**	**Booreiland**	**Caracta**
Background	Design Research	Business & Design	Design	Business & Design	Design Research	Design	Business & Design
Involving stakeholders	External	Internal & External	Internal	Internal	Internal & External	Internal	Internal & External
Focus	Empathy	Brand, Strategy, Innovation	From Products to PSS	Strategy, Service Innovation	Empathy, Service Innovation, Strategy	Strategy, Design	Brand, Strategy

INVOLVING STAKEHOLDERS

Involving stakeholders in a change project is one of the most important aspects. It depends however on the design consultant if primarily internal stakeholders are involved or external stakeholders.

FOCUS

Each design consultant has a different point of focus when it comes to changing the mindset of an organization. None of the design consultants focuses on all aspects of change.

As none of the consultants are specialized in the complete change process, they often team up with others to best suit the needs of an organization. In the case of OHRA, a Dutch insurance company, Erik from Zilver Innovation worked together with Design*Thinkers* and Contextqueen as well as with other partners.

METHODS

In the interviews with the design consultants we focus on HOW design consultants in the Netherlands support organizations in embedding Design Thinking in their organization to enable them to change from NPD towards PSS Design. Each of the interviews took about an hour.

To structure the interviews with the design consultants, 4 main questions were asked during the interviews:

1. What difficulties do you encounter when supporting an organization to change, enabling them to deliver Product-Service Systems?
2. What are the skills of a design thinker that are valuable in this change process?
3. What is your role as design consultant?
4. What does the process of changing an organization look like? What are important moments in this process?

The answers to these questions are each pieces of the larger puzzle of the process of changing an organization. Based on the data from the interviews with the design consultants we have derived themes, for example ‘changing the mindset of the organization’, ‘the importance of facilitating collaboration’ and ‘implementing PSS in the organization’. In the following paragraph, these themes

are explained in more detail and illustrated with quotes from the interviews with the design consultants.

RESULTS

Even though not one design consultant does the same, or comes from the same background, they all value and practice design thinking in similar ways. The design skills and tools they use are similar, but their starting point and focus is different. We will further elaborate on how they use design thinking based on the themes that came forward during the interviews.

STARTING

At the moment, organizations are often aware of the fact that they have to change and they are starting to realize that in order to change they need to adopt new ways/methods to innovate and adapt to change.

Booreiland (2012) mentions: 'Some time ago we got a lot of WHAT questions from companies. Recently they started to come with HOW questions. You notice companies more and more become informed on new ways to innovate and are aware of what it can mean for them. They just do not know how.'

This uncertainty of how they can change and what innovation route to follow, makes the start of a project difficult. Not only do organizations deal with a lot of uncertainty, quite often their problems are undefined or wicked (as mentioned by Buchanan, 1992). So the very start needs to be to formulate the underlying 'change' question. The design consultant helps the organization to define the question, give the project focus and unravel what exactly is the urgency for the company to embark on the change process.

Zilver Innovation (2012) puts it as follows: 'Companies may know they need to change but they don't fully understand why. As consultants we help them unravel the underlying question. We devote quite some time to pinpoint the urgency for change. In order to understand their own future and to remain meaningful in this very complex age, organizations need to understand not just what they do, but also why they do it.

A client of Booreiland (one of the consultancies we interviewed) asked them: 'we hear lots of things about apps, should we have one as well?'

Organizations hear buzzwords going around and see success-stories and wonder if they should do something with these new developments. They do not look what it does, or deliver, but only hear people talking about it. The question beneath is that the organization realizes that it should innovate, but does not know how.

CHANGING THE ORGANIZATION MINDSET

When an organization realizes that design thinking can enable them to change and better adapt to changes in society, it will want to take some steps of action. However, Design Thinking is not something you can easily implement, or outsource. When using design thinking to change, it should become a mindset that will be part of an organization's culture.

Eye-D (2012) claims that you have to start with internal stakeholders: 'It is important to make use of 'hooks' inside the existing organization. You cannot start from scratch. By using what is already there, change will be more easily accepted by the internal stakeholders.'

All design consultants stress the need to use the internal strength in an organization. Stakeholders within have to be actively involved in the process of change. By giving power to people in an organization, and putting them in charge, the changes that are initiated will become theirs and will be adopted easier by the rest of organization.

Contextqueen (2012) says about working with internal stakeholders: 'One key aspect is to have respect for the people you work with and transfer this respect to them so they will have respect for their stakeholders.'

Design*Thinkers (2012) mentions another aspect that is important for organizations to realize: ' The Key Performance Indicators (KPI's) have to match the new organization. Added value cannot be measured on the short term by asking customers to grade your services. Change needs time to be implemented and to create value. This is harder to explain to listed companies than to family-owned companies or start-ups. The latter have more attention for long-term value creation. This creates stability in the company and it gives more space to intuition and emotions.*

Whether the design consultant has succeeded in enabling an organization to change can be assessed by gauging how the people in the organization have changed. How has their skill set developed and how has their willingness to embrace change grown in the course of time? The different consultants that were interviewed mention that in the course of their work with a client they've seen the organizational focus on the future change. They've seen a growing shared appreciation for change and an increasing will to generate knowledge together. This leads to little successes that in turn will give more confidence and more motivation to work together across departments and stakeholder groups. Decision processes become more comprehensible and transparent, and better arguments to make choices emerge. The innovation process in the organization has become more structured. Or better yet, people find it more acceptable to deal with the inherent chaos and uncertainty of the fuzzy front end of innovation.

COLLABORATING WITH STAKEHOLDERS

The design consultant deals with two types of stakeholders: internal stakeholders, like people involved in the project or internal content experts, and external stakeholders like users, external experts, or distributors and such. The process of connecting with internal and external stakeholders is a main part of the work, where the design consultant is the connector and facilitator.

STBY (2012) even states: '50% of our actual time is spend on creating insights and ideas, the other 50% of our time is spent on communicating these through collaboration. For example by facilitating workshops.'

Caracta (2012) says: 'It's not only about content in projects, it is more about aligning people.'

Employees who are willing to participate and contribute to the change process often encounter problems in doing so. These people have passion for their work, energy and personal initiatives to improve the organization they work for. However, they are swamped with their 'daily' work and are not supported by the organization to devote time to change projects.

STBY (2012) illustrates: 'Being involved in a multidisciplinary project is often not in a job description of an employee. The initiative to participate comes from personal interest, curiosity or as a favour to the project leader. There is a large threshold to participate in multidisciplinary projects, as participation is not supported by the organization. Such projects are in effect a form of bottom-up change of organisations. People already have time consuming jobs and make time available for such projects out of personal interest and the change it may cause over time comes with it. An organization should reward employees for their input, instead of maintaining structures that hamper collaboration between disciplines.'

When dealing with changing an organizations stakeholders of all the different layers of an organizations should be involved. They are the ones in contact with customers, or making decisions that will influence the perceived value of the customers.

Eye-D (2012) explains: 'Quite often the engineers are forgotten in the change process. It is important to involve them and let them experience what the effects are of their decisions.'

Zilver Innovation (2012) gives another example: 'We were asked to improve the call center experience of a telecom provider. We learned by talking to the call center employees that it was not the employees that were unwilling to change and improve their service, it was the imposed structured process of dealing with customers that caused most of the problems.'

TRANSLATING INFORMATION

When collaborating with different stakeholders great value lies in the ability of design consultants to communicate project progress. Visualizations that capture and communicate things like the urgency of the project, insights generated by research or the upcoming process steps contribute strongly to the ease with which change is adopted by the organization. Design consultants have the ability to translate these different types of information into a shared visual project 'language' that creates common ground amongst the stakeholders.

Zilver innovation (2012): 'design thinkers are able to gather rich information and make it digestible for others. There is great value in using design skills to visualize rich information enabling stakeholders to share their learning and gain mutual empathy. Quite often a project goes wrong when the results do not communicate the rich insights and reports disappear in a drawer of a desk.'

Being able to quickly move from gathering insights toward taking actions to design change is another strength of design thinkers.

Zilver innovation (2012) says: 'One of the main benefits of working with design consultants is their ability to directly move on form gathering insights towards designing solutions based on the insights. Business consultants gather knowledge but are not able to directly move on towards designing and implementing the insights in the company. Design consultants make sure that their insights are viable and usable for design.'

ROLE OF A DESIGN CONSULTANT DURING THE CHANGE PROCESS

For an organization it is very difficult to find people within the organization with the right skills and experience to implement change. In most cases an external party is needed, for example a design consultant to guide the organization throughout the process. This is not a job you throw over the fence, where the consultant withdraws and comes back with a report a few months later. The consultant is constantly transferring his knowledge and skills to the client.

STBY (2012): 'Design Thinking to us is about training the internal stakeholders with skills (practicing tools, providing a toolbox) and helping them to build a design thinking attitude and mindset.'

Design consultants inspire, translate insights, facilitate the process, analyze the results and provide structure.

Caracta (2012): 'Effectiveness = quality + acceptance.'

All design consultants see themselves as a facilitator of the change process.

Design*Thinkers (2012) say: 'We are not the classic consultants. Key to us is facilitating, building a relation of trust with the organization. We build a new way of consulting. Working together with the organization, not for the organization.'*

As the collaboration between consultants and organization progresses, this relationship changes.

Caracta (2012): 'We build long relationships with our clients. Our role changes towards an educator, sparring partner. We work on a project basis, but gradually the intensity of our input changes.'

Within the organization the design consultant also takes his responsibility to the project leader within the organization.

STBY (2012): 'As consultant we help our project leader in an organization to create a basis, a support within the organization.'

Being a design consultant you do not have a fixed set of skills.

STBY (2012) mentions: 'As consultant you have to change yourself continuously, and grow. Otherwise you will soon not be relevant anymore. You have to work consciously on personal growth.'

PROCESS

There is not one specific process that can or should be followed. All design consultants mention that they are flexible and let the structure of the process depend on the organization, the question and the circumstances.

Caracta (2012) says: 'We do not have a standard approach, each time our approach is built through dialogue with the company.'

There is however one approach to the change process that all consultants share: taking small iterative steps that each end in a period for reflection. This approach is intended to create a stable basis within the organization for change and to engage the internal team of stakeholders.

Eye-D (2012) says: 'Time for reflection is of great importance as a consultant. Reflecting with the organization makes them realize what changes are made or are necessary.'

Contextqueen (2012): 'Service Design is a different market. It requires small iterations (See Figure 1). You have to start by focusing on changing and designing internal processes. Only then can you redesign the products and services. It can not bee seen in a box, it covers different departments in an organization that need to be aligned.'

Design*Thinkers (2012) agree on this: 'You have to limit taking risk by taking small steps at a time. There is no need to work on one big project.'*

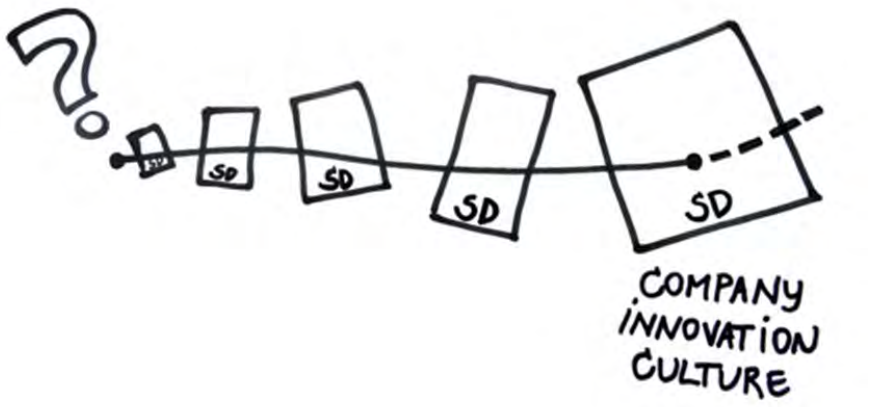

Figure 1 Taking small steps in the change process towards a new company innovation culture. Each step is a design project, each time becoming bigger and having a larger impact on the organization.

Booreiland (2012) *stresses the benefits they experience from a traditional product design background: 'The benefit of being trained as an industrial designer is that the process steps of design are embedded in ourselves. Organizations like the stepwise approach and understand the value of each step. Using the basic steps of the design process makes change understandable and manageable.'*

IMPLEMENTING

The services emerging from a PSS project tend to remain concepts. They are notoriously difficult to get really implemented in an organization. This is the main issue that needs to be tackled to get change to really land in an organization.

Design*Thinkers (2012) do it as follows: 'To implement ideas you have to make use of the trust you have built in an organization, create structures of dialogue (which is not sexy but necessary) and get to your goals in small steps building more trust as you go. You have to combine short term wins with long term thinking.'*

STBY (2012) says: 'Implementing the results that are generated during the design phase is always one of the main difficulties. That's another reason why we work with small 'victories'. These

victories are actually more organization changes than they are designs of Product-Service Systems that need to be implemented. These first victories in changing the organization are needed to let the organization gain confidence.'

DISCUSSION

COMBINING BUSINESS AND DESIGN

Design thinking based solely on the grounds of design will not be able to truly change an organisation. It is only when we couple design process experts (with no vested interest in perpetuating the current way of doing things) with business content experts (who are looking for ways to think differently about their area of expertise), we create a capacity to envision and realize futures that are both desirable for people and viable for organizations. (Coughlan and Prokopoff, 2006). Business speaks the language of the organization while design speaks the language of innovation. Both are necessary and need to be combined. Design thinkers realise the need to know both worlds. Design thinking can only create value if they make use of the organization's existing resources (for example existing reports and figures). Coupling design-process experts with business-content experts within a consultancy creates a capacity to envision and realize futures that are both desirable for stakeholders and viable for organizations.

DANGERS

Reading back, it all seems like success will come as long as you take some things into account and try. But this is not the case. Success stories where organizations really realize change are limited. We may have heard companies like Deloitte, Hewlett Packard and Océ that are using design thinking to change their organization. Some of these stories have indeed led to success. But for most companies it's a long journey. Design thinking faces the problem that more and more people claim to be able to implement design thinking as if it were just a management or creativity tool. The risk exists that designers who are not trained for changing organizations or business people with no feeling of design will use the concept of design thinking in their communication without fully grasping its potential. In the long run this may hamper design thinking's reputation. Design thinking is not learned overnight. It is a field that requires experience, and feeling for both business and design. Also, design thinking is not only about working visually, organizing workshops and using lots of post-its. Changing an organization using a designerly approach is about getting the right mindset to think about the future, to be able to take risks, to see solutions where others see difficulties and to adopt an outside in view that co-exists with the inside out view. it really is quite a challenge that shouldn't be taken lightly.

Design consultants need to stay open for other peoples wants, and not become 'cocky' when becoming more established. All of the design consultants we have interviewed have their own specialization. This is very valuable and design consultants should exploit that more. There should be no fear of competition amongst consultants, there is ample opportunity to collaborate with other design consultants, teaming up for projects to get the right expertise at the table. The way Zilver Innovation, Contextqueen, Design*Thinkers* and others worked together for OHRA is an inspiring example for other design consultants. This culture of collaboration amongst design consultants is growing; just look at the many networks that are set-up where design consultants meet and work together.

IMPLICATIONS FOR PRACTICE

Different aspects have come forward during the interviews with design consultants in practice. But what to focus on? During a personal conversation with Larry Leifer in May 2012, he explains that he sees Design Thinking as the combination of business, design and collaboration. This also comes forward when talking to design consultants. You need business thinking to understand the

organization and get designs implemented. Design is necessary to innovate, and support an organization to really change their way of work. All of this is not possible without collaboration, collaboration between the design consultant and the organization but also collaboration within the organization, between stakeholders with different interests, and between departments. Design thinkers have to be aware that making a difference for an organization does not come solely from the design perspective. Appreciation for business thinking and the importance of collaboration should not be overlooked.

To provide a basic structure for the process of change we have combined the insights acquired during the interviews with the transformation process suggested by Kotter in 1995. When showing this process to design consultant they recognized aspects in their own way of work. Based on the change process of Kotter and the insights of the interviews we propose the process of Figure 2.

The first phase addresses the need to find out what the urgency for the organization. As mentioned earlier, organizations often do not know what they want and how they can achieve this. By getting to know the people in the organization, how they work and what ideas they already have, a start can be made. As soon as the urgency for the organization is unravelled, the team can start with defining the focus for the project.

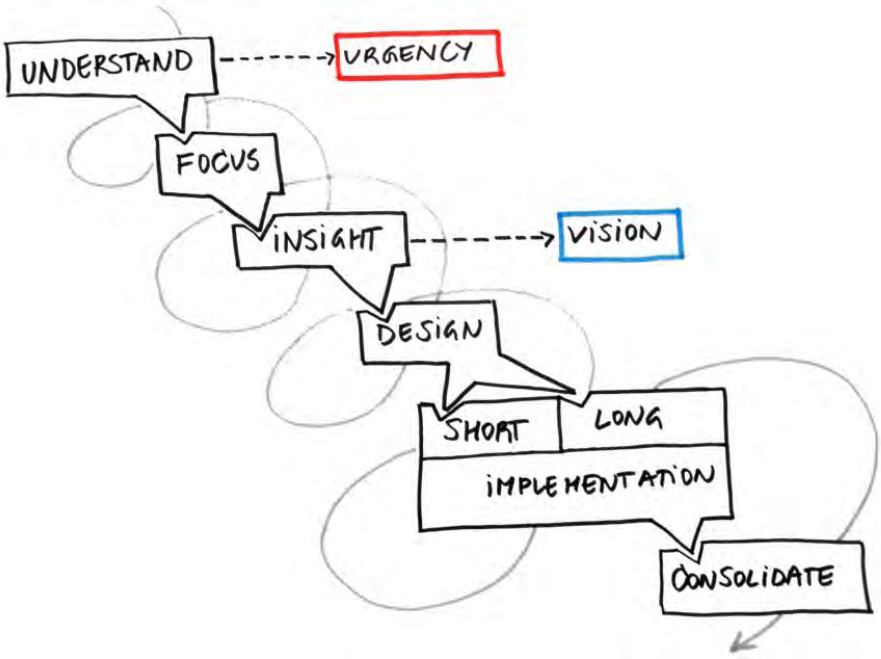

Figure 2 The process for changing an organization based on the interviews with the design consultants. By taking different steps the organization knows what the focus of each step will be and what it will deliver. The entire process has an iterative nature.

In the third phase insights are gathered, either internally or combined with insights from external stakeholders. These insights are necessary to design or improve the new or existing touch points of the organization. The main goal of the first three phases is to create a designerly mindset in the organization. This mindset is necessary to make the organization able to come up with ideas to implement in the organization. These ideas can be divided into two groups: quick short time wins to convince and strengthen the organization, and long term investments to prepare the organization for the future. The last two steps are often forgotten, the need to implement the design in the organization and to consolidate them for the future. This is often the moment where it goes wrong, to make sure the newly created value and its effect can be measured, new KPIs need to be introduced in the organization.

Throughout the process it is important to make use of the strengths of the organization and the knowledge that is already present, either by the people working in the organization or in existing data and already conducted projects.

For design consultants a future with many opportunities lies ahead. Design consultants should keep on challenging themselves, stay curious for the new, develop knowledge during their work, recognize their own strengths and team up to better serve organizations willing to change and create value for their customers.

FUTURE STEPS

At the moment we are already having interviews with design consultants internationally. Interviews have been conducted in for example Germany and the USA. More will follow in the future. During our interviews with consultants we also have been discussing the tools they have been using. Our primary focus in our research is to learn from the experience of design consultants, but we also want to elaborate on the tools they mentioned. We are going to look for the mechanisms behind these tools, and why design consultants are using them. Even though we have specifically chosen to interview design consultants we feel the need to be able to add the perspective from within organizations that wish to change. A story can only become richer by including more perspectives.

In the end the generated insights will be translated to the Smart Textile Services industry. This industry deals with the challenge of being a very product driven industry (producing garments, fabrics, etc) now face their products being combined with technology and value creating services. The first author is working in a project (CRISP, 2012) in close collaboration with this industry.

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LEADING
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RENAISSANCE 3.0: SPEAKING DESIGN

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The terms design, design thinking and digital design literacy are increasingly associated with non-design disciplines as technologically enabled globalised collaboration dissolves boundaries. This paper presents a map of early research emergent from the literature survey of contemporary design theories and analysis of their robustness with respect to a Tri-Unity of Design and toward the definition of an International Design Thinking Index. The index is proposed as a connecting and inclusive language of design to aid global collaboration as the Information Age transitions toward a Creative Molecular Economy. The research argues different perceptions of design can cause confusion and challenge communication for the 21st Century. It reviews the questions that present themselves and pilot data that supports the call for a cohesive language in which all participants have shared meaning.

Keywords: Design, Design Thinking, Digital Design Literacy

INTRODUCTION

A renewed focus on the importance of design in a global context can be attributed to rapidly developing communication technologies and the dissolving boundaries surrounding design (Watson, McIntyre, & McArthur, 2009; Margolin, 1996). As many discipline boundaries merge within an expanding global marketplace, it is evident firstly, that design is becoming more valuable in previously disassociated fields, and secondly that design is no longer just the domain of the specialised designer, namely a person who designs (Brown, 2008; Mau, 2004; The Genius of Design, 2010, Disc. 1; Queensland Design Strategy 2020, 2010; Victorian Design Action Plan 2011-2015, 2011). Furthermore, there is evidence to suggest that design is central to solving significant problems; issues such as global warming, disease and terrorism among others (Mau, 2004).

The word design can be difficult to define, as perceptions of its meaning may come from individual points of view or from members of specific professional disciplines. For example, the engineer learns design as a process, extending an idea to implement a purpose, whereas the graphic designer may focus on visual and aesthetic appeal rather than on practical or non-functional requirement (Main 2002). These examples highlight increasing cross-disciplinary communication issues and confusion within individual design disciplines, each accustomed to its own pattern of thinking.

Sensitivity to design outside the design discipline appears to be mixed. Design is often undervalued, especially in the field of economics. This is possibly due to the designers' lack of appropriate communication with respect to their economic contributions (Heskett, 2009). Bruce Nussbaum is one of the most influential people in design (as voted in I.D.Magazine) and he

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contends "… CEOs and top managers hate the word design as they associate it with "…curtains, wallpaper, and maybe their suits" (para. 6). Nussbaum (2007) has long called for CEOs to engage with design thinking and not just associate with it through their employees, but has more recently expressed frustration that the construction and framing of design thinking has not been successfully adopted by organisations (2011). Despite these recent assertions, there remains the acknowledgement that business managers are facing a future of increasing ambiguity and rapid change, with many ill equipped to meet the challenges. Despite Nussbaum's fears there appears to be evidence that management leadership is fostering design culture in several successful international organisations such as IBM, Sony, Apple and Samsung, and others (Jeong Song and Chung, 2008).

While it is further acknowledged that not everyone wants to be a designer, or even be involved with design, it is nevertheless predicted that a new economy, namely the Creative Molecular Economy, will emerge over the next ten to fifteen years (2022 – 2027). This new economy is expected to connect "…new knowledge to new resources in the creation of transformational projects..." (Centre for Communities of the Future, 2012, para.5). Therefore, the technologically enabled and globalised collaboration occurring with the onset of the Creative Age, enhanced by the apparent removal of boundaries around disciplines, will require 21st Century business leaders, executives, designers, non-designers, human resource managers, higher education students and enabled amateurs from any field to communicate through sharing a common language based around design.

The research presented in this paper underpins early research that calls for a connecting language: an International Design Thinking Index (IDTI). It is proposed as a benchmark or index for use across a variety of sectors that integrates fundamental knowledge of design, design thinking and digital design literacy referred to as a Tri- Unity of Design. The proposed language is not envisaged as a curriculum design or as a substitute for formal education but as a fundamental element in bridging the gaps of understanding between collaborative partners. This paper incorporates an illustrated map (Figure 1) of the proposed Tri-Unity of Design representing its relationship to economic ages, world issues, communication, technologies, employment and selected theories that underpin design. The placement of the circles within the category clusters is provisional and they will be positioned with hierarchy of importance with further research. Green circles represent the categories underpinned by an approach to design that places humans at its centre. A perspective of the categories, sub-categories and renaissance analogy displayed in Figure 1 is further outlined in the paper.

The grouping of Theories of Design includes a preliminary comparison of Functional Theory by philosopher, John Dewey (1910, in Littlejohn & Foss, 2008) and the problem solving steps of Design Thinking as proposed by Tim Brown (2008). It briefly explores the Concept-Knowledge Theory (C-K Theory) introduced in 2003 by Hatcheul and Weil; the Theory of Pure Design (Ross, 1907); and Gestalt Laws (Behrens, 1994). Further theories that merit investigation, but are beyond the scope of this paper, will be explored at a later date and include the Design-Driven Innovation Process Model, (Acklin, 2010), Deconstruction, and Semiotics (McDermott, 2007). In conclusion this research reviews the questions that present themselves and pilot data that supports the call for a cohesive language about design in which all participants have shared meaning.

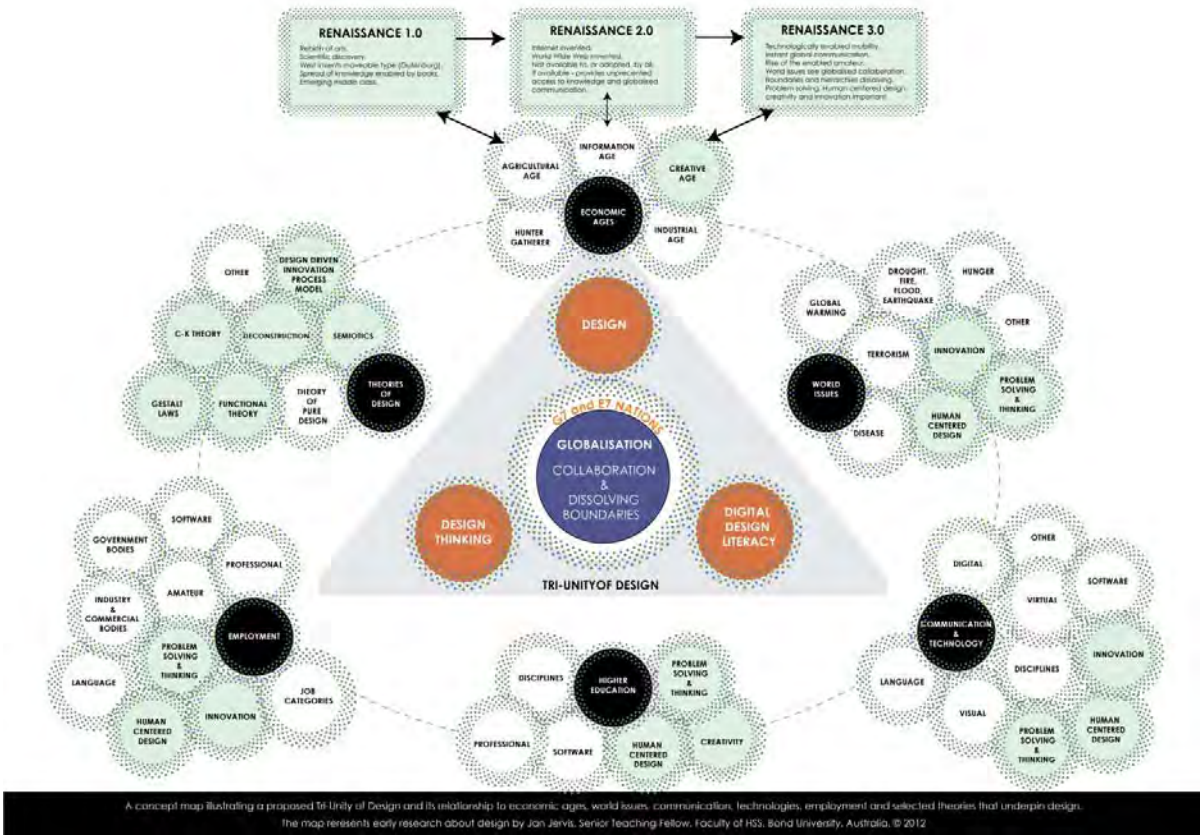

Figure 1 The research concept map and a proposed Tri-Unity of Design illustrating its relationship to economic ages, world issues, communication, technologies, employment and selected theories that underpin design.

TRI-UNITY OF DESIGN: CONCEPT MAP EXPLAINED

Terms such as design, design thinking and digital design literacy are appearing regularly outside the traditionally recognised design disciplines (Adobe Education, 2011). To the non-design professional, it may appear these terms are connected and thus share similar meaning through the common factor of the word 'design'. Literature however, confirms that design thinking is not actually about design and a designer may not 'think' like a designer regardless of their expertise or design education (Mootee, 2012).

In the United Kingdom, the Arts and Humanities Research Council (AHRC) acknowledges how contemporary research is adjusting to changing technologies and emerging cross-disciplinary employment (AHRC, 2010). In Australia, Professor Roy Green, Dean of the UTS Business School and a member of the Australian Prime Minister's Manufacturing Taskforce, supports a motion by the Australian Design Alliance (AdA) towards a National Design Policy for Australia. Green asserts, *"The question is not whether Australia can afford to invest in design, but whether we can afford not to"* (AdA, n.d. para. 6). Similarly, Professor Sue Wills, on behalf of the Australian Council for Humanities Arts and Social Sciences (CHASS) and a member of the AdA, pledges support for a design policy with the proviso that it embeds design thinking into all levels of Australia's education curricula. These claims echo those made by President Obama, in his State of Union address, 2011, as he calls for America to embrace innovation and "…out –innovate, out- educate, and out-build the rest of the world " (cited in Wingfield, 2011)

DEFINING DESIGN

There is no single definition to adequately define and cover the variety and range of concepts gathered under the word design. Professor of Design, Management and Information Systems at the Weatherhead School of Management at Case Western Reserve University, Dr. Richard Buchanan acknowledges the polysemy of design. He calls for a definition of design, not aligned

with trade, industry or profession, but rather as a new 'liberal art of technical culture' (Buchan, 1992, p.5). Despite some criticism of design education and its ability to deal with the ambiguousness of creativity associated with design (Teal, 2010), in the *manifesto on the role of design in the 21st Century,* produced by Danish Designers (2010), it is argued that the future professional must combine creativity and innovative problem solving to create value across disciplines.

DEFINING DESIGN THINKING

The expression 'design thinking' is attributed to Herbert A Simon, 1969 (as cited in Buchanan, 1992) and is an attempt to identify and describe a holistic concept. Rylander (2009) disagrees and contends that this term is confusing and that the concept cannot be defined in a straightforward way. Nevertheless, there appears to be a common view point that the design thinking process can be applied to both analytical and experiential engagement thus providing a powerful way to interact (Teal, 2010) whilst also overcoming limited imagination and the perception that something is impossible (Buchanan, 1992). Tim Brown, CEO of the global design consultancy IDEO, identifies Thomas Edison, the prolific inventor, as an early example of a design thinker. Edison's ability to envision how interactions with his inventions may occur is fundamental to a thinking process that places humans at the centre of design (Brown, 2008; Julier, 2008). Similarly, Fry (2006) illustrates how students, from different disciplines, collaborating on designing a bridge, demonstrate a human centred approach to design. He emphasises that students must focus on the whole problem, namely how to cross the river, rather than the physical measurements of the bridge and therefore view the bridge from numerous perspectives such as the "…70-year-old pedestrian, 45-year-old motorist, 12-year-old bicyclist, and the 19-year old laborer who will participate in the construction" (p.6). Design thinking that uses a human-centred approach to design is therefore described as the holistic process of addressing the whole problem rather than a particular problem and as such becomes the foundation for design thinking.

DEFINING DIGITAL DESIGN LITERACY

A definition of digital design literacy is merging and morphing along with the changes occurring in the digital world (Adobe Education, 2011). The contribution made by digital technologies is resulting in new roles that are directly related to each individual's interaction with the media (Oxman, 2006). For instance, statistics support that knowledge and skills relating to software, such as Adobe Photoshop, Adobe Flash, Adobe Dreamweaver, Adobe Premiere and Adobe Acrobat, are increasingly expected outside traditional art and design professions (Adobe Education, 2011). To manage these rapidly changing needs for business and academic faculty, Ellen Lupton (2007), designer and author of many books and articles on design, calls for a new perspective towards the teaching of software. She notes there is no theory to underpin the commercially driven software that is used to visually demonstrate the language of design. Lupton further argues that software is a 'bridge between theory and practice" (p. 150). Dr Clarence Tan, Adjunct Professor Bond University, the Australian and Malaysian ambassador for Singularity University, asks us to embrace technology, arguing that it can be used to solve any issue (The Arch, 2012). On a more cautionary note, however, Ramneek Kaur Majithia (2011) reminds students not to rely only on software, but rather use it as a support for the brain and for design thinking. The influence of digital media on design and thinking is emerging as a major research topic within a constantly and rapidly evolving field (Oxman, 2006).

THEORIES OF DESIGN

Although the practice of design research is increasing, it is not yet a fully recognised academic discipline (Chen, 2007). To establish a better understanding of design, and the theories relating to the different design disciplines, this research seeks to explore, compare and contrast a selection of theories that underpin the Tri-Unity of Design. Figure 2 is a visual representation of the Theories of Design category, extracted from the concept map illustrating this research outline. The cluster of

circles represents the group of theories identified for further investigation. The placement of the theories within the circle cluster is conditional and it is proposed the theories will be positioned within a hierarchy of importance and relevance to their relationship to the Tri-Unity of Design.

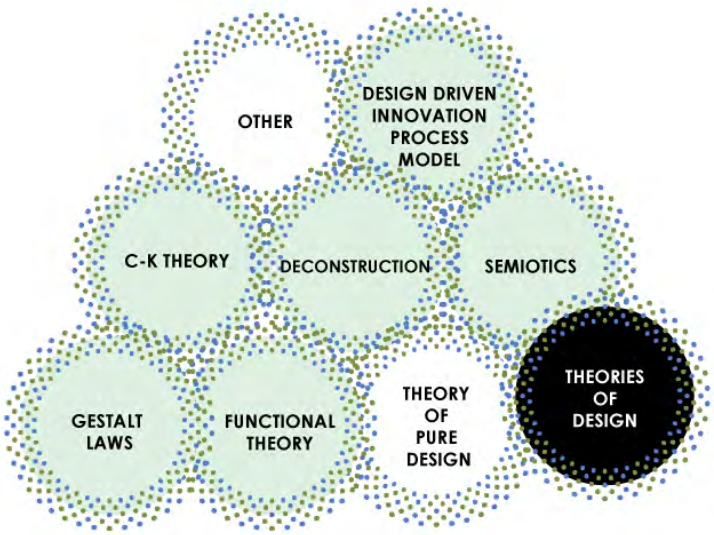

Figure 2 Selected Theories of Design. The cluster of circles identifies the group of theories selected for further investigation and their relationship to the Tri-Unity of design. Green circles represent a theory underpinned by a focus on humans at the centre of design thinking.

The following sections of the paper briefly explain the theory headings displayed in Figure 2. These theory categories are Functional Theory, Concept-Knowledge Theory, Theory of Pure Design and Gestalt Laws. Furthermore, toward integrating theory with design Functional Theory is compared to the steps proposed for design thinking.

DEFINING FUNCTIONAL THEORY

Functional Theory can be aligned with global collaboration and communication that considers how a group functions and processes the sharing of information, thus identifying possible methods for shaping the outcome of a group. Philosopher John Dewey has influenced this approach since his work entitled *How We Think*, first published in 1910. Subsequent work by Dewey includes a theory for the process of problem solving in which he proposes a set of six specific steps. The first step calls for an expression of the dilemma, the second requires definition of the problem, the third is an analysis of the definitions, the fourth encourages possible solutions, the fifth compares and contrasts the suggested solutions to determine the most appropriate path for acceptance and the sixth and final step implements the chosen solution (Littlejohn and Foss, 2008).

COMPARING FUNCTIONAL THEORY AND DESIGN THINKING

Although design thinking is not promoted as a theory the steps and processes outlined in Dewey's Functional Theory can be aligned with design thinking, as it is also a term used to describe a process for group problem solving (see Table 1). For design thinking, Brown (2008) separates the process into three major categories with steps within the categories to assist with navigating the process. The first category is inspiration, which includes two steps: expression and definition of the problem or issue and observation of the world and human needs. The second category is ideation with three steps: organisation of information, brainstorming and rapid prototyping of multiple solutions. The third and final category of Brown's design thinking process is implementation where two steps call for the final solution to be completed and then presented. Table 1 provides a comparative overview of the steps Brown proposes for design thinking aligned with Dewey's

functional and group problem solving theory steps. The comparison shows fundamental similarities within the two problem solving thought processes for group collaboration.

Table 3 A comparative alignment of Dewey (1910) steps for the Functional Theory process and Brown (2008) categories and steps for a design thinking process.

STEPS	DEWEY (1910)	STEPS	BROWN (2008)
1	Expressing a difficulty	1	Inspiration Define the problem or issue to be resolved Look at the world, observe, what do people think, need, want?
2	Defining the problem		
3	Analysing the problem		
4	Suggesting solutions	2	Ideation Organise information Brainstorm Prototype possible solutions, as many and as quickly as possible.
5	Comparing alternatives and testing them against a set of objectives or criteria		
6	Implementing the best solution	3	Implementation Execute the vision Present the case

DEFINING CONCEPT-KNOWLEDGE THEORY (C-K THEORY)

Creativity is often considered an essential component of design. It has been argued that design, in any form, is unable to exist without creativity (Sarkar & Chakrabarti, 2011). On the other hand, design thinking is perceived as more important than creativity. For example, to provide satisfactory outcomes for humanity the design thinking process can be positioned to create a channel for seemingly directionless creativity (Boland and Collopy, 2004). Professor of Mines ParisTech Dr. Armand Hatchuel and Professor of Mines ParisTech Dr. Benoît Weil have created a theory called the Concept-Knowledge Theory (C-K Theory). They consider their relatively new theory unique, particularly in comparison to other design theories, as it encompasses both creativity and design. (Hatchuel and Weil, 2003).

The Concept-Knowledge Theory (C-K Theory) can be synthesised within a Design Square (see Figure 3) and its proposed application is not limited to any one discipline or field. The Design Square highlights the dynamic dependence of Knowledge on Concepts and vice versa (see Figure 4). The C-K Theory seeks to address the enigma of design space and the logical and non-logical components that contribute to the uniqueness of design thinking. It considers that the beginning of any design process is conceptual, for example, a thought or desire on the part of the participants. However, to be considered a Concept (C) within this theory the proposed factor cannot be considered logical, in other words, and in keeping with the randomness of creativity, it cannot be labelled true or false. As soon as a concept is defined as a factually based idea, it is no longer a concept and becomes knowledge; therefore it must pass to the Knowledge (K) space. The design process develops and expands as the concepts become defined as true or false and merge into accepted knowledge, thereby producing potentially unexpected results (Salustri, 2005). It is proposed that further investigation into this new theory and its alignment with the Tri-Unity of Design will be undertaken during further research study.

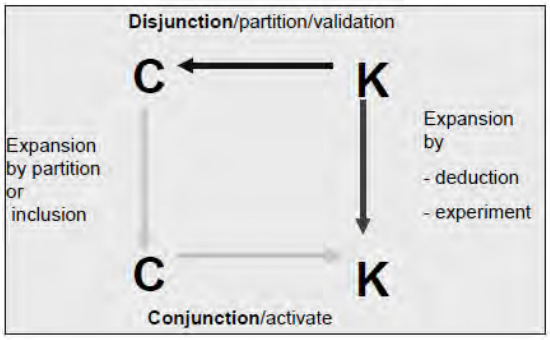

Table 4 The C-K Theory Design Square.

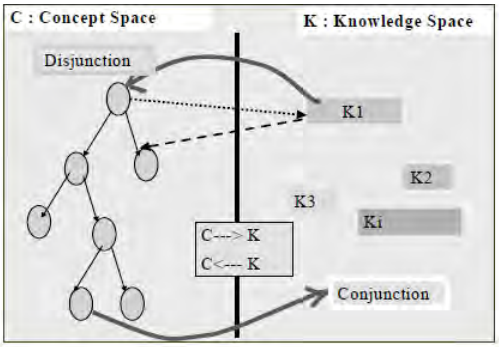

Table 5 C-K Theory Dynamics.

Source: Hatchuel, A. and Weil, B. (2003).

DEFINING THEORY OF PURE DESIGN

In 1899, Arthur Wesley Dow, frustrated with the traditional academic view that art must be realistic, proposed the concept of design as an organisational principle within a studio environment, not as art criticism, but as a 'perceptual and creative skill in studio practice" (cited in Kim, 2006, p.14). This call for change also resulted in Denman Ross, a contemporary of Dow, publishing the Theory of Pure Design, Harmony, Balance, Rhythm. The basis for Dow's theory is his observations of the order and balance he observed in nature (Ross, 1914). Unfortunately the theory failed to resonate with the academic environment. As recently as 2006 the merit of the theory was acknowledged but its limited academic acceptance subsequent to publication was attributed to its "…dry text and uninspiring illustrations…" (Kim, 2006, p.15). Nevertheless, in retrospect, Ross and Dow are considered influential in design education.

DEFINING GESTALT LAWS

The Gestalt Laws are the fundamentals of Gestalt Psychology, a process of scientific thinking originally proposed by Max Wertheimer at the end of the 19th Century. The laws reflect the separate parts that make up a whole event and are regularly used by visual artists and designers to determine a cohesive view of their work (Behrens, 1994, Graham, 2008). For this research the Gestalt Laws are aligned, not only to visual design, but to the human –centred approach behind the design thinking problem solving process.

ECONOMIC AGES

In this section the economic ages (see Figure 5), historical events and influences of design are documented as an aid to anticipating and balancing contemporary and future social transformations (Margolin, 2009). A brief outline of the main economies associated with the West is presented in this paper, however, it is envisaged that further investigation will also include influences of design and technology from within the seven emerging economies identified as: China, India, Brazil, Russia, Indonesia, Mexico and Turkey (Hamilton, 2011). In future research the economic ages within the circles of Figure 5 will represent a hierarchy of importance to the Tri-Unity of Design. The circle within the cluster that is green represents the Creative Age as an economy underpinned by a human-centred approach to design.

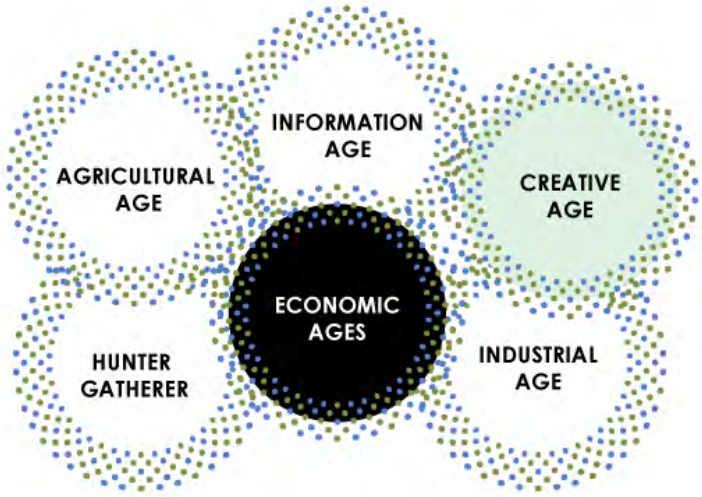

Figure 3 A visual representation of the Economic Ages extracted from the Tri-Unity of Design concept map depicting this research outline.

DEFINING HUNTER GATHERERS

Early humans, in order to survive, were compelled to hunt, gather food and protect themselves from the elements. More than 10,000 years ago, humans lived a transient existence, roaming to find more abundant resources. Anthropologists refer to this era as the age of the Hunter Gatherer (Marlowe, 2005; The Genius of Design, 2010, Disc. 1). It was not until the hunter-gatherer acquired knowledge of the seasons, and devised solutions to combat food shortages, that cultural and economic growth could advance.

DEFINING THE AGRICULTURAL AGE

Solutions designed by the hunter-gatherer to assist economic growth also facilitated the development of commercial craft enterprises creating an early civilisation referred to as the Agricultural Age (Elliott and Jacobson, 2002). In the 14th and 15th Century a rebirth of interest in the arts, quests for knowledge and the birth of the liberal arts, became known as the Renaissance (Buchanan,1992). This began in Italy eventually spreading to, among other countries, France, Holland and England and is retrospectively recognised as the first stage of modern design practice. Artists of the time practised *disegno,* the word for drawing, creating an apparent division of labour, where thinking and observation about the work is separated from the practice (Julier, 2008). The development of the printing press in Europe, by Gutenberg in 1439 (approx.), further revolutionised the spread of knowledge throughout societies as the new technology ignited an unprecedented demand for books. In addition to the inevitable economic benefits for industries, such as papermaking, there was significant increase in levels of literacy and knowledge and ultimately a strengthened economy (Annerberg Learner, n.d.). The Agricultural Age, dominated culture and society until the industrial revolution began in Britain in 1760, marking a period of disruption and change brought about by advancing technologies, which signalled the transition into Industrial Age.

DEFINING THE INDUSTRIAL AGE

In Britain from 1760 onwards, there was massive population growth, with radical advances in technology and industrial mass production that saw the Industrial Age eventually spread around the world. Steam powered machines operated with minimal human aid enabling increased efficiency and production, thus providing economies of scale and reduced costs. Manufacturing became all encompassing and the main source of economic growth. In retrospect the period can be viewed as the turning point, the dividing line, between the productions of effects and the emerging role of the designer (Ashton,1994; Elliott and Jacobson, 2002). An example of emerging

design practice at this time was Henry Ford. Although Ford did not invent the automobile, he is recognised as the creator of the efficient manufacturing assembly line. Although Ford and his collaborators did not call or think of themselves as designers, their Model T Ford, transformed society and people's perception of freedom along with the manufacturing process in an unforeseen way (The Genius of Design, 2010, Disc. 2). In 1913, the manufacturing process introduced by Ford became the basis for *Fordism*, which is considered a major 20th Century achievement. *Fordism* was observed by a group of European architects, one of whom, Walter Gropius, was keen to apply it to architecture. Gropius would eventually establish the Bauhaus School transforming established standards and revitalising the discipline of architecture (McDermott , 2007).

The Arts and Crafts Movement emerged in the late 19thCentury as a direct reaction against the effects of industrial advancement and the perceived erosion of traditional human values. One of the founders, William Morris (1834-96) is considered an influential figure in artisan design. This movement placed Britain at the centre of a new interest in design, and as design culture evolved, Morris focused on reviving traditional art and craft methods. The disruption of World War I (1914 - 1918) affected the actions of the Arts and Crafts Movement, leading to its eventual decline but the debate on the merits of craft versus machine and the purpose of design continues (McDermott, 2007).

As design became more separated from the arts, it began to acquire its own identity with specific rules and expectations (Julier, 2008). Although, traditional teaching and learning continued as if the Industrial Age did not exist; architecture, in particular, appeared in crisis (Whitford (1984). Despite this resistance, reform of design education emerged in Europe in 1919 with the establishment of the Bauhaus, referred to as an art school for the modern times. The original aim of founder and architect, Walter Gropius, was to unite every discipline, within the agenda of the building (Bauhaus Archive Museum, n.d). Despite the school's revolutionary ideals the curriculum did not focus on integrating new technologies. This is attributed to Gropius who, previously attracted to the processes of Fordism, changed his focus after experiencing terrifying interactions with the power of the machine during World War I. He became convinced technology was not a positive contribution to German reform and as a result early Bauhaus placed its emphasis of craftsmanship. It was not until Hungarian Lazlo Moholy-Nagy joined Bauhaus, that the potential of embracing technology was recognised. In 1922, Moholy-Nagy wrote an essay entitled *Constructivism and the Proletariat*, in which he positioned machines and technology as the emergent core strength of the century (Whitford, 1984). Subsequently, in 1923 Bauhaus changed its program to embrace the new unity of art and technology (Bauhaus Archive, para. 2). Bauhaus went through three distinct phases in Germany and was eventually shut down by the Hitler régime in 1933. Bauhaus is regarded as revolutionary in art education and establishing standards, and continues to exercise a profound influencing over aesthetics, form and structure in architecture, industrial design and graphic design to the present day (Whitford, 1984).

DEFINING THE INFORMATION AGE AND THE KNOWLEDGE WORKER

The Information Age emerged after a communication renaissance of unprecedented access to knowledge occurred: the Internet. The first documentation regarding the creation of the Internet is 1962 (Internet Society, 2012). This era, referred to as the Information Age, places the Internet, computers and telecommunications at the centre of manufacturing and production for the 20th Century. However, it could be said that it was the invention of hypertext and subsequent development of the World Wide Web by Sir Tim Berners Lee in 1989, combined with the prolific mass adoption of the personal computer, which revolutionised global communication and collaboration for the 21st Century (W3 Consortium, 2012).

It is the nature of this global communication and collaboration that has created unprecedented challenges for the workplace. Drucker (1994) coined the term *knowledge workers* in 1959 when he predicted social transformation for the 21st Century. He argued that the ownership of knowledge, rather than the traditional industrial work model of previous economies, could potentially create

social and economic inequality. Furthermore, technologically enabled mobility means the knowledge worker is no longer confined to a desk but engaging and collaborating in solving global issues, which in turn can affect business and its perception of, and engagement with design. (Drucker,1994; Watts-Perotti, Wall, & McLaughlin, 2010). By extension, the vast amount of information available to anyone connected to the World Wide Web encourages personal control over education and knowledge acquisition. This developing environment has given rise and new prominence to the enabled amateur. This is significant as there are large numbers of amateurs, such as non-design professionals and workers, who are required to create, produce and interact with media every day. Debate exists over the amount of help with design such amateurs should receive and whether it is best for them to understand the complexity of design therefore raising their levels of design literacy and the quality of work outcomes, or whether such assistance will devalue the design professions and diminish the value of formal training. (Beegan & Atkinson, 2010).

The knowledge worker is challenging the traditional 20th Century notions of the manufacturing workplace, and the result is a division between the 'mind workers' (engineers, attorneys, scientists, professors, executives, journalists, consultants) and low skill, low wage, service providers (Drucker, 1999). Although, access to knowledge does not automatically make knowledge workers knowledgeable, they are inclined to actively seek information they perceive is important to them. Their understanding of the value of such knowledge leads them to express frustration at educational outcomes that they do not perceive as being supportive of their needs (Watts-Perotti et.al, 2010).

DEFINING THE CREATIVE AGE

The predictions for the Creative Age, labelled the Creative Molecular Economy, position it as a direct response to the transformations occurring in organisations of the Information Age. Molecular refers to the biological and dynamic framework that represents transformation stemming from new ideas. Fundamental to a creative culture is collaboration. As humans are required to take responsibility for continued learning, they must develop the capacity to identify gaps in trends as well as nurture their abilities to innovate continuously (Center for Communities of the Future, 2012).

DEFINING RENAISSANCE 1.0, 2.0, 3.0

In this paper Renaissance 1.0, 2.0 and 3.0 are used to analogously to compare the three rebirths of communication overtime. The analogy provides a summary of the three renaissance periods extracted from the Tri-Unity design concept map (see Figure 6). Renaissance 1.0 represents the much-documented Renaissance of the Middle Ages and the cultural changes that occurred. In addition to the artistic rebirth it was also the period of scientific investigation and the spread of knowledge facilitated by the innovation of the Gutenberg printing press. Renaissance 2.0 refers to the creation of the Internet and World Wide Web that has enabled unprecedented global communication. Renaissance 3.0 represents the transformation and re-emergence of design as a human–centred process embracing creativity, innovation and design thinking, and forming a nexus with global communication.

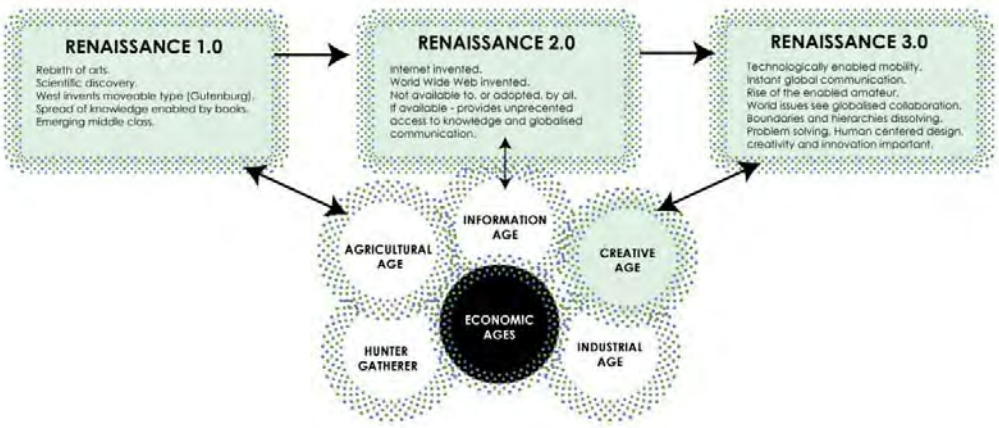

Figure 4 A visual representation of the Economic Ages and their relationship to the analogy of Renaissance 1.0, 2.0 and 3.0 from the Tri-Unity concept map depicting this research outline. The green colour depicts concepts that can be aligned with the human as the

EMERGENT QUESTIONS

This research was initially inspired by ethnographic observations of instances where different perceptions of design caused confusion and hampered communication. These observations further prompted the researcher to seek perspectives from students of higher education that were undertaking an introduction to digital media class. The question "*What do you think or understand when you hear the word design?"* was framed. The class survey was presented during the first lecture, and prior to any structured learning. As students can enrol from any discipline, not necessarily a design related discipline, with any level of experience from within the university, the respondents varied in cultural background, degree program, age and digital design experience. The answers showed differing perspectives, which indicated contradictions in defining design. These responses echo the call for a cohesive definition of design in which all participants have shared meaning (Buchan, 1992). It is acknowledged that the responses of the students may have been influenced by the fact of being in a design class and consideration of this will be taken into account when gathering further data for the research.

Creating categories of extracted keywords from student responses and aligning them with the discipline areas of the students determined results (see Table 2). Thirty-three students responded to the question. The items tabled reflect only the responses relating to degree programs and individual perceptions of design. Responses indicate that 33% of the students related the meaning of the word design as having visual or aesthetic context, 33% used the word creative or aligned design with creative tasks and 18% felt it related to products or end results such as advertisements, websites, logos and images. It is noted, that while all students, except one, had an opinion about design, none of the responses considered design as a problem solving process.

Table 6 Responses tabled of higher education students to a single question class survey: "What do you think or understand when you hear the word design?" Groups of degree categories are aligned with keywords extracted from the responses to represent individual student perceptions of the word design.

Student Discipline Area	Responses	Generalised keywords of student responses to: *"What do you think or understand when you hear the word design?"*
Multimedia Design	11	Creating, creativity, colour, layout, image, artistic, visual communication, beauty, individuality, weapon of selling, planned.
Computer Games	4	Art, fashion, architecture, music, thought behind media, pictures, fancy designs, colours, space, layout, text.
Film and TV	2	Artistic expression, Photoshop, Illustrator, advertising and creativity.
Communication/Marketing and	9	Combination of lighting, font, colour, and shape in

Business		harmony, form, function, individual message, construction of a created thing, decisions /selection of elements, creativity, artistic, creating fashion, images, visually pleasing.
Computer Systems and IT	2	Appealing, don't know.
Finance /Finance IT/ Finance History	3	Everything in place for a reason, creativity and aesthetically pleasing, difference between a sale and loss of a sale, advertisements, logos magazines etc.
Psychology	1	Organised creation
International Affairs, Anthropology	1	Express a feeling in a particular fashion.
Total Responses	33	

The results, while informal, are considered relevant as students originated from multiple disciplines, not necessarily related to design, with varied cultural backgrounds, ages and degree experience (see Figure 5). The degree areas were categorised as Multimedia Design, Computer Games, Film and TV, Communication, Marketing and Business, Computer Systems and IT, Finance, Psychology and International Affairs, Anthropology. Figure 5 is a visual representation of the percentage of each degree category within the thirty-three respondents.

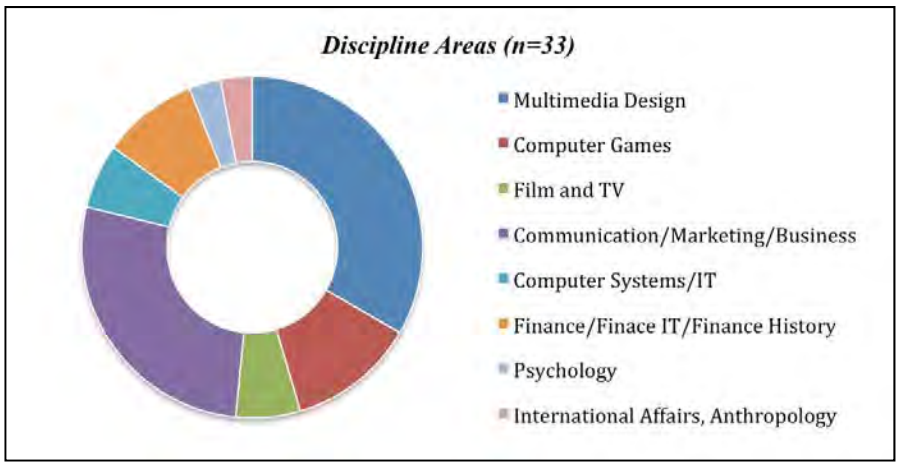

Figure 5 A percentage overview of degree discipline areas extracted from student responses to the question in the student survey.

A visual percentage of the keyword categories extracted from the responses illustrates the vagueness of how design is perceived (see Figure 6). Figure 6 reflects only the percentage of responses that relate to the meaning of the word design. The categories of keywords defined as: Visual, Aesthetic or Communication, Strategic Placement or Structure, Adverts, Logos, Websites, Fashion and Images, Artistic Expression, Creative Tasks, Adobe Software, For Sales and Don't Know.

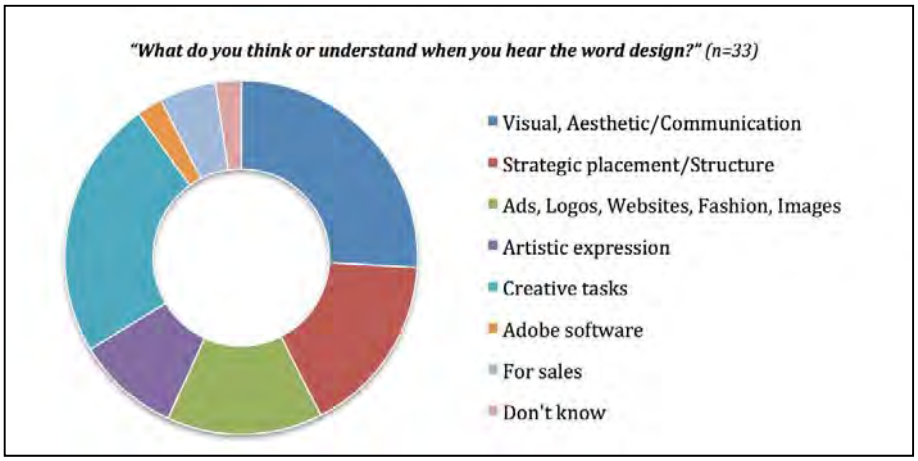

Figure 6 Reflects the categories devised from the keywords extracted from student responses to the question in the survey.

DISCUSSION AND CONCLUSION

This research explores the following questions emergent from the literature survey of contemporary design theories and analysis of their robustness with respect to a Tri-Unity of Design and toward the definition of an International Design-Thinking Index. The questions that present themselves are:

- What fundamental design theory, design thinking or digital design literacy knowledge/skills are consistently requested by employers in [selected] job recruitment advertisements?
- What categories, disciplines or fields are represented in these advertisements?
- How do [selected] universities integrate design theory, design thinking and digital design literacy within non-traditional discipline areas?
- How do [selected] professional organizations (not necessarily design organisations) perceive the importance of design theory, design thinking and digital design literacy knowledge in employees?
- How do [selected] students in design and non-design fields, within higher education, perceive the importance of design theory, design thinking and digital design literacy knowledge for the future?

Data collected will from the research questions will indicate whether an International Design Thinking Index (IDTI) is feasible as a connecting design language, likely to enable and enhance communication of design in the global context.

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EMOTIONAL DESIGN METHODOLOGY BASED ON CULTURAL VALUES AS TOOL FOR INNOVATION: AN APPROACH

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In Latin American countries where there is no remarkable industry development, but cultural production and manufacturing instead; it is precise to find a solution where innovation aims to achieve marketing competitiveness. When understanding the magnitude of the emotional and cultural weight of these products, a redefinition of the design practice related to the subject should take place by comprehending the importance of cultural values and the transcendence they may have in users when these are immersed in products.

To achieve this purpose, this article presents a proposition of rethinking the design foundations by which cultural products are built, redirecting it to the notion of "going-back to the origins" in an attempt to revitalize traditions, interiorize cultural values and understand the cultural nature to rescue what might be distorted or lost.

Keywords: cultural product; cultural values; emotional design

TOWARDS A DEFINITION OF VALUE (AND CULTURAL VALUE) AS STARTING POINT TO STUDY EMOTIONS

A great variety of innovation tools and methodologies exist with the purpose of product, service and business progress, improvement and perfectioning. This innovation is bind to the type of condition that needs improvement, so most in Latin American countries where there is no prominent industrial development but manufacture and cultural production instead; the innovation around this practice should fix in the foundations related directly to it. Although the term "cultural product" comprises a variety of products depending on the perspective studied, for this particular project the notion of 'cultural product' refers to objects designed as from cultural and patrimonial (tangible or intangible) foundations, bind to a community and culture[v]. Due to these specific characteristics, it is pertinent to comprehend the importance of cultural values and the emotional response of an individual towards the transcendence that this products may achieve in order to explore the potential that the design practice may have for finding innovative solutions for marketing competitiveness.

This approach of "going back to the origins" is no novelty. Different authors have highlighted the importance in questioning the standardization and modernization of products in general when the results tend to lack, or be narrow in meaning. For example, the dialog between Benny Ding Leong and Hazel Clark (2003) focused on the teaching-course development is based on the importance of culture and its material representation through design; thereby manifesting cultural exchange

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and appropriation phenomena and the need of going back to the origins in an attempt to revitalize traditions and promulgate the meaning of cultural roots[vi].

From this historical perspective, Tim Dant (2007) illustrates that

> *…humans stand from other animal species not only because of their upright posture, the size of their brains, their use of language and the opposition between thumb and forefinger, but also because of the way they create, use, and live with a wide variety of material objects... Things, both natural and man-made, are appropriated into human culture in such a way that they re-present the social relations of culture, standing for human beings, carrying values, ideas and emotions.*

Now, although it is certain that objects satisfy needs or interests, they also enable a degree of social identification and (both individual and group) identity construction. Consuming a product does not only mean buying, owning and using, but also experiencing. If a product has a cultural load, then these experiences would be directly related to the culture that the product belongs to and represents. This is why, when a cultural product is being designed, it is important to understand the culture surrounding and supporting it, since this is the one in charge of infusing meaning, recognition of a collective memory and cultural shared values. In the words of Tim Dant (2007:2) “Material culture ties us to others in our society providing a means of sharing values, activities and styles of life in a more a concrete and enduring way than language use or direct interaction”.

With this distinct direction, this article presents the theoretical background that supports the development of a design methodology in which cultural values and their relation to emotions are the starting point for innovation and value creation in the making of cultural products. The objective is to rethink the design foundations of cultural products, improving competitiveness as well as enriching symbolic meaning and cultural essence.

This theoretical background is structured in three consecutive sections that support each area involved in the sustentation of the methodology. First, since it is impossible to address values apart from culture, (1) an approach in the definition and importance of culture in regards to human behaviour, consumer habits and valuable possessions will be presented, and framed inside this conception a brief explanation of the principles of cultural hierarchy and its repercussion in cultural products will be exposed. Then, (2) the discussion towards the notion of value will be presented as outline of the different connotations that the ‘value concept’ has in different areas, related to the concept of hybrid cultures in the specific Latin American panorama. And to conclude, (3) the relation between the notions of value as motivational construct intrinsically linked to emotions allows a direct connection of the concept to the emotional design theories[vii]. These three pillars (culture, values and emotions) support the design methodology, which relates the importance of cultural values and its implications in the design practice when related to emotions. This relation evidences the relevance of culture and values among people (at a personal and social level); raising the possibility or redirecting the foundations of design proposals towards cultural roots and consequently enriching the cultural production that characterises Latin America.

Subsequently, this article manifests the relation between design and the social sciences related to human behaviour such as philosophy, sociology, anthropology, and psychology; structuring the guidelines to modify or clarify the concepts conceived in these disciplines that are closely related and should be explored from their socio-cultural aspects within design.

(1) THE NOTION OF CULTURE AND CULTURAL PRODUCTS FRAMED BY PATRIMONIAL LEGACY

Jorge Enrique Caballero (2007) considers that “patrimony is the full and extensive expression of any human culture” (translation by Maria Ana Barrera, 2012), and by expression he refers to tangible and intangible goods[viii]. Particularly in Colombia, the Ministry of Culture (2010. Translation by Maria Ana Barrera, 2012) states that this patrimony

> *"generates sense of identity and establishes links with a collective memory. It is transmitted and recreated throughout history according to its environment, interaction with nature and history, and contributes in promoting respect towards cultural diversity and human creativity".*

The factors are determinant to understand patrimony for its symbolic and representative nature of the culture it belongs to and evokes.

Everything that belongs to the patrimonial legacy of a nation involves and legitimizes the material and immaterial manifestations of its culture[ix]. In this way, culture and patrimony can be considered as bi dimensional factors that comprise abstract and intangible concepts such as behavioural patterns, values, norms, ideological postures, traditions and costumes; as well as tangible goods and the material representations of these abstract concepts previously mentioned (cited in Yang and Gong, 2009).

The notions of culture and patrimony related to a society make it evident that when referring to either one, an immediate relation to human values is derived; one cannot be explained without the other. Among the different definitions of culture that can be found, Fan (2000:4) puts forward that

> *…culture can be described as the collection of values, beliefs, behaviors, customs, and attitudes that distinguish a society. A society's culture provides its members with solutions to problems of external adaptation and internal integration.*

And he adds, "culture is best embodied in the values its people hold... cultural values shape people's attitudes and guide their behaviour (Fan, 2000:4).

This undisputed manifestation of values as judgment standards that shape individual and social character is evidenced throughout the documentation from a variety of authors in regards of culture and its meaning. Some of the definitions related to this particular investigation are:

"The integrated sum total of learned behavioural traits that are shared by members of a society" (Hoebel, 1960. Referenced by Fan, 2000:3).

"Culture is learned, shared, compelling, interrelated set of symbols whose meaning provides a set of orientations for members of a society. These orientations taken together, provide solutions to problems that all societies must solve if they are to remain viable" (Terpstra and David, 1985. Referenced by Fan, 2000:3).

The essential core of culture is the traditional ideas (historically generated and selected) and specially the values linked to it (Cited in Kroeber y Kluckhoholm, 1952)

All in all, patrimony may be conceived as the sum of all human expressions within a culture and it is interrelated to the value concept as behavioural axis or guiding point of the parameters to abide in that precise culture. Furthermore, concepts like 'acquired habits and learned sets', among others, are linked to the notion of value as motivational and behavioural construct. So, the value nature of guideline or judgment to steer actions, preferences and likes, shows a direct relation between values and character shaping as well as the individual social position within a group evoking the social features that values imply when viewed under a cultural perspective.

Still, beyond the meaning of culture, it is necessary to contextualize the previous notion of culture within the conception of the contemporary world in which culture, aside from satisfying these characteristics previously mentioned, conveys also the connotation of hybridism. This phenomenon does not mean that cultures are sums of different random features, but structured combinations and (contingent and historical) articulations of elements that acquire meaning in the relational frame. The hybridism processes in the particular case of Latin America started around the Colonial period[x], when the mixture of different cultures started the permeabilization of frontiers and boundaries between the native and forester traditions (Canclini, 1989). An example of this phenomenon is the Barranquilla Carnival (Colombia) that dates from 1876. This carnival is a result

of the tri-ethnic combination between Spanish, African and native Latin American traditions (Colombian Ministry of culture, 2002) that converge in a multicultural expression that exhibits the exchange, mixture and enrichment features of hybridism.

Grimson (2011:138), addressing the matter talks about culture as “the practices, beliefs and routinely meanings firmly sedimented” (Translation by Maria Ana Barrera, 2012), and in addition he transports this definition to a contemporary reflection when mentioning that the elements that constitute culture are not static, permanent or definite. Due to migration, frontiers permeability and media development, they are in constant change. As matters now stand, when referring to ‘culture’, heterogeneity is implied.

The process of cultural exchange is the starting point for research studies like the ongoing dialog mentioned before, between Leong and Clark (2003) towards the design of products focusing on the importance of culture and its material representation; evidencing the need of rescuing and revitalizing traditions, and promulgating the meaning of cultural roots. Still, it is important to understand that although the exchange processes tend to occur, now sharper than before, the original ideas should transform but not get distorted or lost.

Around the same panorama of cultural diversity and complexity, Canclini (1989) and Hannerz (1998) also believe in rethinking the established perspective emphasizing that cultures are not static, pure, and homogeneous. Instead, they are diverse, and mixed, they generate changes, and construct and reconstruct towards the movement generated by migration, mass media and the increasing access to education and communication. For these reasons Canclini (1989:15) questions the boundaries between traditional standards and modern perspective, and puts forward the idea of

> *…generating a different way to conceive latin american modernization, beyond an outside, dominant force that operates by substituting what is own and traditional, even more so as the attempt to renovate with which diverse sectors take charge of heterogeneity and multi temporality within nations (Translation by Maria Ana Barrera, 2012).*

In this contemporary context of constant change and rearrangement, diversity not only remains but it is evident and presented in daily basis.

Particularly in the Colombian culture, as it has been noted, foreign symbols, practices and other elements have found room within the cultural mix. Evidence of these processes can be found in the different artisan labours, and artistic representations and performances; as well as in the material representations of this cultural legacy. These products that materialize a nation’s culture and cultural exchange hold an immense emotional and motivational potential that can be exhibited and translated from the construction, communication strategy, commercialization and proper use of the product. Restating the design outline, development and, until some extent, distribution and commercialization through a new methodology is possibly one of the paths to follow to allow the proper innovation of these products.

(2) THE VALUE CONCEPT

The notion of value in regard to the sciences concerned with human behaviour has different connotations that are worth distinguishing in order to establish the type of value which is being discussed. Either in economics, sociology, or design, the concept of value tends to be related with a variety of topics or the discussion around it may be bleary due to the lack of clarity or the variety in meanings. Boztepe (2003) very accurately, traced an outline of the definition of value with the purpose of distinguishing the diverse notions that could be related to design. Based on this distinction, this article intends to deepen the terminology and nail down the notion of value as motivational construct to consequently approach this notion to a definition of cultural value.

The rising interest that the discussion towards value has led in the field of design grows stronger with the necessity of this practice to create superior value (and subsequently create competitive advantages) among the highly standardized products of today's economy. According to Kim and Maugborne (1999)"providing value for users/customers is creating 'quantum leaps' in their experiences with product. The issue does not seem to be whether companies should compete on user value delivery, but rather how to do it and how design can contribute to user value creation" (Kim and Maugborne, 1999. Referenced by Boztepe, 2003).

After grasping the importance of the value concept in the design field, it is important to analyze what constitutes value around the social sciences and its validation within design.

1.1 VALUE AS QUALITIES INHERENT IN OBJECTS

This conception of value arises from the inquiry of the source or origin of values. Is it a subjective abstraction of the meaning that the subject gives to the object? Or is value integrated by the physical qualities of the object per se? According to Boztepe (2003), "in axiological theory, a bipolar distinction exists between objectivists and subjectivists. Positioning value as inherent in the object, as Marx claims, and existing before a subject interacts with or evaluates it, is a firmly objectivist view".

Another perspective to this notion is stated by Porter (1985) who believes that value "is gradually added through the different stages of product development, manufacturing, and distribution", which means that the designer or producers embeds the product with value in its development (Porter, 1985. Referenced by Boztepe, 2003). Features like appealingness, utility, efficiency, and the set of physical characteristics of the product give value to it.

1.2 VALUE AS MEANING

Value as meaning is addressed by Mihaly Csikszentmihalyi and Eugene Rochberg-Halton (1982: xi) in their analysis on the role of objects in people's definition of who they are, were and expect to be; relating their research to the fact that "the potential significance of things is realized in a process of actively cultivating a world of meanings, which both reflect and help create the ultimate goals of one's existence".

Following this statement, Krippenbdorff believes that "meaning is a cognitively constructed relationship. It selectively connects features of an object and features of its (real environment or imagined) into a coherent unit" (Krippenbdorff, 1989. Referenced by Boztepe, 2003). This mainly states that meaning implies a relation between self, object and context, "when we confront a thing, we usually do so in a context of cultural meanings that help us interpret the object... the network of cultural meanings is 'always already there' mediating the transactions" (Csikszentmihalyi and Eugene Rochberg-Halton, 1982:50).

Value as meaning has a distinct connotation in design due to the possibility that users may invest objects with a set of meanings other than the real function for which the product was designed; valuing it because of what it represent rather than by what it is or because of its qualities. "The real meaning of a possession, like that of a dream, does not lie in its manifest content but, rather, in its underlying latent content" (Csikszentmihalyi and Eugene Rochberg-Halton, 1982:23).

1.3 VALUE AS EXCHANGE

Value has an economic connotation when it is measured "in terms of the monetary sacrifice people are willing to make for a product. The emphasis is on the point of exchange and cash is seen as a fundamental index of value" (Boztepe, 2003).

Marx distinguishes a dual nature in value: use-value and exchange-value. This last refers to the work, production, and further labours needed to create the product; while use-value alludes to the experience of the user with it (Mandel, 1990. Referenced by Boztepe, 2003). The concept of experience is popular around the design practice; it is not only about satisfying needs, but also to create the precise conditions for the user to have meaningful experiences with the product.

Nonetheless, designers also attend the different factors that influence costs like materials, production, man work, market indexes, as well as the benefits acquired when purchasing the product.

1.4 VALUE AS EXPERIENCE

Boztepe (2003, 2007) addresses the discussion towards the notions of value and their relevance in the design field. Her findings conclude that value-as experience is the most precise, successful approach to resolve the understanding of value in design. In the words of Halbrook (1999), “value resides not in the product purchased, not in the brand chosen, not in the object possessed, but rather in the consumption experience(s) derived there from” (Halbrook, 1999. Referenced by Boztepe, 2007). This perspective encompasses aspects of the alternative definitions as it reconciles the approaches mentioned before.

The core of value as experience resides in the fact that since products enable experiences for users, then better experiences would result in greater value (Cagan and Vogel, 2002). Therefore, the experiences of the user with the product are responsible for the value assignation. For example, the willingness of the user to assign an economic value or to consider the assigned value as congruent depends on the advantages that the experiences with the object provide, probably due to its inherent qualities and the meaning they represent to the user.

However, within Boztepe’s guidelines there is one notion that although is mentioned by her as ‘enduring beliefs’, it should be analyzed in a deeper sense: value as motivational construct, which explains human behaviour and therefore has an immense impact in the previously mentioned notions.

1.5 VALUE AS MOTIVATIONAL CONSTRUCT

This notion of value has been studied from the different sciences concerned with human behaviour. For both Durkheim and Weber, values are crucial for explaining social and personal organization and change (Durkheim, 1893, 1897 and Weber, 1905. Referenced by Schwartz, 2009). Different disciplines like psychology, anthropology and sociology use values to describe groups and individuals since they are used to characterize societies and individuals, to trace change over time, and to explain the motivational bases of attitudes and behaviour (Schwartz, 2009).

The Value Theory established by Schwartz is driven by value as what is important for an individual in his/her live. This type of value encompasses the following characteristics:

- “Values are beliefs tied inextricably to emotions. When values are activated, they become infused with feeling” (Schwartz, 2009:2). For example, people who value tradition and costumes are not likely to replace a functional family herence for the latest and newest catalogue sofa.
- “Values refer to desirable goals that motivate action” (Schwartz, 2009:2). People that believe in the importance of family are constantly attending to their family's’ needs and will protect and care for their loved ones.
- “Values transcend specific actions and situations”; they are abstract goals (Schwartz, 2009:2). An isolated episode of a family confrontation does not imply that the subjects involved do not care about family; it might be a priority, but there was a momentary conflict.
- Values serve as standards or criteria guiding the evaluation and selection of people, actions and events. People decide (consciously or unconsciously) what is good or bad, justified or illegitimate, worth doing or avoiding, based on possible consequences for their cherished values (Schwartz, 2009:2). Daily or critical decisions are influenced by values and value priorities. From choosing a master degree at a specific school, to buying a distinct type of mobile phone, consciously or unconsciously, values mediate the decisions.
- Values are ordered by importance relative to one another. People’s values form an ordered system of value priorities that characterize them as individuals and this order of importance guides action. This herarquization varies from individual to individual and along societies so it is

important to understand, not only what the individual, or group considers important, but also the herarquization of these values, either at a 'micro' level (own personal set) or 'macro' level (learned cultural behaviour). "The relative importance of multiple values guides action" (Schwartz, 2009:2).

The above characteristics are universal for all values. What distinguishes them from one another is the type of goal or motivation that they express which is grounded on three universal requirements: biological needs, social interaction, and survival and welfare of groups (Cited in Schwartz, 2009). Depending on these requirements and goals, different values and value domains can be traced (self-direction, hedonism, security and tradition among others). Since there are situations in which values may conflict or be congruent, this relation guides the action to follow in regards to what it is most important for the individual.

This sociological, psychological and anthropological conception of value shows a fundamental factor in the study of human behaviour that should be taken into account in the design practice. Values determine conducts and actions towards any situation so they trace human behaviour towards the environment, and what integrates it. Value as meaning, exchange, experience, etc., are bounded to the notion of value as motivational construct that conditions every decision (conscious or unconscious). There lays the importance of the analysis of values in design, practice that is constantly studying users, needs, expectations and motivations. By being considered as such, it is evident that to redefine the design guidelines for products with cultural meaning and support, it is fundamental to understand the relevance of cultural values it may represent. Lifestyles are shaped by individual and socially shared values.

1.5.1 CULTURAL VALUE

Graeber (2001) also refers to values as the conceptions of "what is ultimately good, proper or desirable in human life" (Graeber, 2001. Referenced by Boztepe, 2007). As it was said before, this noticeable approach to the notion of value as criteria, judgement standard and motivational abstraction underlies beneath human behaviour. Since values are responsible for people's judgement towards actions, events and other people, then a socially learned behaviour, dispositions or motivations that are shared by people of the same culture could be taken as cultural values and as such, cultural values may be crucial in the development of a methodology that aims to strengthen value for users.

(3) UNDERSTANDING CULTURAL VALUE IN LIGHT OF THE EMOTIONAL DESIGN

Having explained the concept of value and cultural value, the next step in understanding the background for the design methodology is to contextualize the pertinence of the value theory in the emotional design field. In order to do so one must (1) comprehend appraisal as the cognitive and reflexive process (conscious or unconscious) that sets out the attitude of an individual towards any situation, action or person, (2) deepen in the transcendence of value within appraisal as linchpin or motivational axis. Afterwards, to understand in depth emotions (3) study the laws of emotions established by Frijda to analyze the universal normative around this subject, and finally, establish the role of design in the study and creation of cultural product in which values mediate every process regarding user and product (conclusions). These steps consequently show the strategy and methodology that uses values, emotions and experiences as starting point in the design of cultural product with the purpose of delivering greater significance and providing better experiences.

It is important to recall the clear distinction previously set regarding the notion of value since this particular study is centred in the perspective of value as motivational construct and criteria that goes beyond inherent qualities and punctualizes behavioural and hierarchic features. But at the same time, cultural value is established as crucial variable to sharpen added and symbolic value in products.

(1) APPRAISAL (COGNITIVE PROCESS)

Theorists like Norman, Arnold and Jordan have influenced Desmet theories about appraisal until a point where he has related, summarized and applied most of their research to synthesize one pragmatic study. His work is founded in the fact that emotions are genuine, personal and driven towards situations, persons or events that are considered important.

Nevertheless, there is a common mistake in the use of the word 'emotion' which is often applied to a wide variety of phenomena, such as passions, sentiments, temperament, and moods. 'Although these words are regularly used interchangeably, they do in fact refer to specific and different experiential phenomena... the word "affect" (or affective state) is used to comprise all these phenomena' (Desmet, 2002:3)[xi]. This particular article focuses on emotions which are intentional and involve a relation between the subject experiencing them and the object that stimulates it; and acute in comparison to other affective states[xii].

The cognitive perspective to study emotions states that in order "to understand emotions, one must understand how people make judgments about events in their environment, for emotions are generated by judgments about the world" (Desmet, 2002:10). This process known as appraisal holds that it is not the event the one responsible for the emotion, but the meaning of the event instead. For Desmet, an appraisal is a "non-intellectual automatic judgment of the meaning of a situation, in which our concerns serve as points of reference" (Desmet, 2002:195), which means that through appraisal, people assess and judge if a stimulus (person, action or event) is beneficial or harmful and the response to this evaluation is translated in an emotion. In short, "appraisal is an evaluation of the significance of a stimulus for one's personal well-being. It is this personal significance of a product, rather than the product itself, which causes the emotion" (Desmet, 2007:6).

Figure 1 shows the process drawn by Desmet in which an emotion is delivered through appraisal. For this particular study, the stimulus will be the product, although stimulus may vary. The subject's concerns are interests, motivations and goals (all of which carry values as latent content). Through appraisal, the stimulus or its meaning is evaluated in regards to the subjects concern resulting in an emotion.

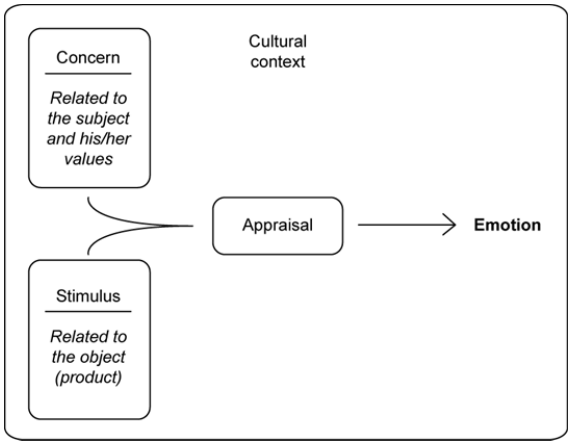

Figure 1 Appraisal process adapted from Desmet (2002).

In like manners, Ratner (2000) believes that the type of emotion experimented in a particular situation depends on the understanding (concept, representation, schema) of it. By understanding he means not simply attaching a positive or negative value to a situation, but understanding the characteristics, causes, and consequences of an event. The power of thinking to determine the quality of emotions is evident in the fact that if we re conceptualize an event years after it occurred, the emotional reaction may be altered (Cited in Ratner, 2000). The understanding of the situation includes many abstract variables that can cause changes in the process; this is why the first reaction towards a product may change after reflecting on it. Still, the process tends to be

determined by the context in which the event occurs and this context is linked to the cultural scenery. As it was said before “the network of cultural meanings is ‘always already there’ mediating the transactions” (Csikszentmihalyi and Rochberg-Halton, 1982:50).

In sum, when studying the behaviour of the subject, it is crucial to understand the cultural context. Therefore, when analyzing the proposals for the study of product emotions, there are certain elements that can be seen as common: context (culture related), stimulus (product related), and concerns (subject related).

Within Norman’s theories three levels of information processing are determined. The first, most elementary level is the visceral where action is reactive (reflexes and instincts). The second phase is the routine concerned with learned behaviour. And the last level, the more sophisticated involves cognitive processes. Each level corresponds to an emotional approach in design: visceral is concerned with product appearance, behaviour is expectation-based and relies on the usage and effectiveness of products, and the reflexive emotion corresponds to intellect, reflexion, self-image, personal satisfaction, and memories (Cited in Norman, 2004).

These levels of information processing determine that there are different ways to interact with products. It is responsibility of the designer to understand the level to which the product should reach to have the expected reaction in the user. When the matter is related to cultural values if the intention is that the subject understands and appropriates the emotional and cultural content of the product, it is necessary to create the conditions by which the cognitive comprehension of the meaning and message is reached.

(2) VALUE AS MOTIVATIONAL AXIS IN APPRAISAL

The variable of concern (related to the subject), determines the attitude and position taken (consciously or unconsciously) and the emotions awaken in regards to the situation (stimulus within the context). “The point of reference in the appraisal process is a concern, that is, a more or less stable preference for certain states of the world” (Frijda, 1986. Referenced by Desmet, 2007:7). When relating Frijda’s and Desmet’s finding, there is a close relation of the sociological notion of value and the motivational concern that determines human behaviour.

Desmet (2007) explains that emotions arise from encounters with events that are appraised as having beneficial or harmful consequences for the individual’s concerns, that is, his or her major goals, motives, or well-being (Frijda, 1986; Lazarus, 1991. Referenced by Desmet, 2007:9). “Concerns are the dispositions that we bring into the emotion process, and stimuli are construed as emotionally relevant only in the context of one’s concerns” (Lazarus, 1991. Referenced by Desmet, 2007:9).

There is a common classification of the different concerns: attitudes (preferences and likes), goals and standards (social norms); but when this classification is analyzed under the perspective of value as motivational construct, the relation between this concept is evident with each type of concern. An individual’s preferences, goals and standards towards what he/she considers preferable or favourite are shaped by what he/she considers beneficial, good and important; so as a result, the three types of concern are influenced by values. And these values explain the bases of attitudes and behaviour (Cited in Schwartz, 2009).

Cultural products are embedded with history, identity and folk beliefs; features they lead to a valuation influenced by motivations drawn by the socially learned knowledge, as well as norms associated with survival needs, principles of pleasure or displeasure, among other component of emotions. In this instance, the emotional link arises due to the symbolic content derived by the collective memory that resides in the cultural product and suggests a reflective and volitive involvement.

(3) UNIVERSAL FACTS IN EMOTIONS

The subjective nature that emotions tend to entail, criticized by Fridja for mystical and unfounded, gives to emotions an idiosyncratic illusion. But as Desmet describes, “although people

differ with respect to their emotional responses towards a given product, in spite of these interpersonal differences, the process of emotions, that is, the way in which emotions are elicited, is universal" (Desmet, 2002:195). The laws of emotion written by Nico Frijda enable the study around the process by which emotions are awaken (not the result)[xiii], this allows an approximation to the study of emotions among people and cultures. This study on emotions can be approached empirically in bootstrapping fashion; by assuming that what we call 'emotions' are responses to events that are important to the individual… these responses – 'emotions' – are subjective experiences. Their core is the experience embedded in the outcome of appraisal (Frijda, 1988:351). This implies that emotions suggest the cognitive process from which a set of rules can be described[xiv].

THE LAW OF SITUATIONAL MEANING

This law is closely related to appraisal and understanding of an event. Emotions arise in response to the meaning structures of given situations; different emotions arise in response to different meaning structures (Frijda, 1988:349). As it was mentioned before, the appraisal process is mediated by a subjective component: concerns (influenced by values) and the judgement that the subject conducts in respect to these criteria. "Particular events elicit particular types of emotion: Grief is elicited by personal loss, anger by insults or frustrations" (Frijda, 1988:349).

Thus, it is important to understand that when the product has cultural content that needs to be delivered to the user; the designer must understand how this content matches the subjects values and which would be the best way to enable the proper experience for the subject to understand the meaning implicit in the product.

THE LAW OF CONCERN

The laws of concern and situational meaning are closely related. Previously the matter of meaning and its relation to values was mentioned for it explicitly ties meaning, values and concerns:

> *Emotions arise in response to events that are important to the individual's goals, motives, or concerns. Every emotion hides a concern, that is, a more or less enduring disposition to prefer particular states of the world (Frijda, 1988:351).*

THE LAW OF APPARENT REALITY

This law makes emphasis in the degree of intensity of emotions that corresponds to the magnitude of its effect on the individual. Frijda states that an event closer to the reality of the subject has greater impact.

> *The law of apparent reality applies to numerous instances of strong emotion in everyday life and explains important phenomena, such as the absence of strong emotions where one might have expected them. Grief dawns only gradually and slowly after personal loss. Emotions often do not arise when being told of loss, and the loss is merely known. They break through when the lost person is truly missed (Parkes 1972. Referenced by Frijda, 1988:352).*

It is also valid to argue that the way in which the event is presented will have an effect with similar conditions as the ones stated by this law. For example, seeing a picture of malnourished children in Choco (Colombia), has different magnitude when compared to a report about malnutrition and mortality rates.

THE LAW OF CHANGE AND HABITUATION

This law stands by the fact that emotions are awaken by a change that occurs in the present state; either because of a stimulus or because the stimulus ceased to be present. This change has a repercussion equivalent to the magnitude of the change, "the greater the change, the stronger

the subsequent emotion" (Frijda, 1988:353). Habituation is what happens when there is a constant exposure to the same stimulus or change, which eventually results in the emotional wear off.

THE LAW OF CONSERVATION OF EMOTIONAL MOMENTUM

"Emotional events retain their power to elicit emotions indefinitely, unless counteracted by repetitive exposure that permits extinction or habituation" (Frijda, 1988:354). This means that once an emotion has been awaken towards an event, if he/she is exposed again to this stimulus (not constantly), the emotion may resurface again, either because of the stimulus, the remembrance of it, its meaning, or a new acquired meaning.

This laws presented by Frijda (1988) contemplate different characteristics in the appraisal process that make it possible to study emotions, until some extent. Moreover, when they are analyzed from the perspective of rethinking the design foundations of cultural products there are some statements worth highlighting. In the first place, the law of situational meaning links values to the cultural context in which emotions are elicited evidencing what may seem obvious in design, but has a psychological and sociological transcendence: a cultural product is loaded with meaning that should be understood by the user in addition to the meaning given by him/her upon interaction; thus, if appraisal is influenced by socially learned values, then the starting point of analysis is to understand within the precise culture, what is considered potentially meaningful and important.

On the other hand, when understanding cultural value as abstract goal socially learned and shared; and assuming that emotions are elicited in response to concerns, interests and motivations, the cultural value can be then taken as the variable related to the subject within the appraisal process, following the law of concern.

Moreover, the law of apparent reality sets the conditions in which the design practice should unwind knowing that the magnitude of the emotional response depends on the relation of the subject with the reality presented by the product. For example, a cultural product from a festivity like the Barranquilla Carnival in Colombia will elicit different emotions to those that participated in the event, had a close encounter with the people and lived the celebration, who will then experience more relevant and substantial emotions in comparison to those that have only heard about the celebration. Still, as part of the objectives of the methodology, since the product should be recognized and cherished for its latent value, the way to compensate the absence of previous experiences should be found to increase the magnitude of the emotions potentially elicited (either by means of message, communication strategy, etc.).

And last but not least, the law of change and habituation enables the understanding of a common problem with cultural products and a crucial factor to take in account when looking for ways to innovate in the matter. If the user indeed habituates to constant exposure to the same stimulus and consequently the elicited emotions cease to appear; then the design guidelines for this products should rethink the previous strategy. The law of conservation of emotional momentum may also intervene in the relation between product and user by considering that the physical context is as important as the temporal variable and both require a point of equilibrium; constant exposition may decrease the emotional response, but the previous experiences of the user with matters related to the product, its meaning and emotional connotations may on the contrary present an appropriate scenery for highly emotional interaction.

CONCLUSIONS: THE ROLE OF DESIGN POINTING TO CULTURAL VALUES AND EMOTIONS

When Csikszentmihalyi and Rochberg-Halton analyzed the different periods of humankind history (Neolithic, Bronze and Iron ages, and so on) they illustrated how each era has been marked by the significant objects present at each time.... "Evolution tends to be measured not by gains in intellect, morality, and wisdom; the benchmarks of progress have to do with our ability to fashion things of ever greater complexity in increasing numbers... the transactions between people and the things they create constitute a central aspect of the human condition". (Csikszentmihalyi and Rochberg-Halton, 1981:ix). Thus, if history has been marked by the discovery, creation and use of objects,

there is a substantial argument in the importance of design, argument that grows stronger with the fact that “the things with which people interact are not simply tools for survival, or for making survival easier and more comfortable. Things embody goals, make skills manifest, and shape the identities of their users”.

As Leong and Clark (2003) described it, nowadays, worldly interests are more personal than they have ever been. Everyone can choose what is valuable, important and even pertinent to them; even in terms of culture. Thus, for design to succeed in revitalizing traditions and cultural values, an overview of how these variables are modernly perceived may guide the notion of what is valuable at the present time. So, as to the resolution to recover what might have been lost or distorted through the recapitulation of values to enrich the cultural meaning and potential emotional content of cultural products; cultural value and personal value systems must be the background for the analysis regarding motivations, goals, and emotional targets. Due to the relatively cultural and personal orientation of people and groups it is important to know where this variables come from; concerns are founded on values and values derive from what drives people and groups. To capture this in design, cultural and personal concerns must be evaluated within the emotional response to any product, especially those embedded with highly cultural content.

Ratner considers emotions to be “interdependent and interpenetrating with other cultural phenomena” (Ratner, 2000:1), and he also believes that the development and cultural functions of emotions are determined by the social activities and cultural concepts of a society. This means that there is a link between what is recognized as the context in which the appraisal process occurs, the resulting emotion, and the cultural variable socially established, learned and shared. Csikszentmihalyi and Rochberg-Halton (1981) explain that the cultural net of meaning is constantly mediating every transaction, which may lead to consider that the cultural variations in emotions are relative to the cultural orientations from which they derive, and in the particular case of products with high cultural content; the culture’s concerns and values must be evaluated and related to the conditions in which the emotions are elicited.

Values, as well as emotions, establish the attitude of an individual in regards to the environment, pulling him/her towards or away from people, products, events, etc. Emotions are elicited not by the stimulus per se, but by the meaning the subject add to it and this meaning are subject to personal and cultural values. Therefore, if values underlie beneath concerns, expectations, goals, needs and interests and dispose the subject’s potential reaction towards the environment and stimuli; then by understanding the appraisal processes and the intervention of cultural values as elements of culturally learned judgement; research towards innovations methods should focus on culture, society and cultural values.

If in addition, a product has cultural background, because of its origins, it already carries value; so it would seem obvious that its design process would imply a methodology rooted in the importance of values, motivations and cultural traditions. But the design of these products is usually a traditional labour instituted with time, shared through generations; not a task in constant progress, or looking to implement new measures or tools to promote innovation.

In countries like Colombia, a diverse, never-failing resource of cultural products can be traced. These cultural products have greater emotional and valuable content that what may commonly be seen. Manufacture, for example usually requires man work that exhibits unique results for each product. Therefore, the product has a narrative integrated by stories that enclose traditions, techniques, roots, cultural meaning, etc. However, this products have not been innovated or improved and in today’s world, they have lost most part of its transcendence as evidence of cultural legacy worth treasuring. So an innovation solution is presented in which the designer serves as articulator of cultural values and emotions to renovate existing product and communications strategies, or to design new products with cultural content and meaning based on cultural values.

Therefore, in the path to revitalize the origins and traditions by means of values in order to embed cultural products with present or potential meaning and emotions; the methodology to follow would be:

PHASE 1

(1) To begin with, a deep study of culture, and social constructs; as well as historical background, cultural roots and its contemporary perceived notion of what is valuable.

Once the background is grasped, (2) within this study, recognizing collectively shared values, memories, motivations and relations of meaning will result in a recompilation of values that might be expressed by the culture with further corroboration. (3) The outline of resulting values should be analyzed under the perspective of values as motivational constructs to understand its emotional implications

PHASE 2

Analyze the findings of the previous phase under the foundations of the emotional design; consolidating insights, characteristics, and requirements that should be embedded in cultural products as well as setting the scenery and stimuli necessary to facilitate the creation and understanding of value. A parallel comparison can be made to visualize the values that in fact are manifested. And further on, this parallel may help to corroborate if the product embodies the same characteristics.

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[v] The concept 'cultural product' tends to include innumerable types of products that can be related to the notion of culture. Art and consumer products may be considered as such, but for this article, 'cultural product' is delimited by the concepts of tradition, community, heritage and culture.

[vi] The study is worth contextualizing since it started when one of the authors lived in Hong Kong, British colony in China that would be repatriated in 1977. This historical moment and the circumstances in which the author was engaging (soon to travel to England to start a master degree) consequently trace the scenery for him to start questioning about the cultural weight of traditional China.

[vii] It is important to mention the clear distinction presented in the literature around the value concept, since this particular study emphasizes Shalom H. Schwartz' perspective of values that goes beyond the inherent qualities in objects and transcend as criteria, and motivational constructs. The second chapter of the article discusses the matter.

[viii] Tangible goods are "all those human-made and natural products that reflect a series of pre existences and permanencies in a territory" (Caballero, 2007. Translation: Maria Ana Barrera, 2012). These goods are physical and material; contrary to intangible goods that "comprise symbolic manifestations, traditions, worldviews, behavioural patterns, religious beliefs, folklore and language, that are continuously recreating in society and being reproduced generation through generation (Caballero, 2007. Translation: Maria Ana Barrera, 2012).

[ix] For any good (material or immaterial) to be considered patrimony of a distinct culture, it must be recognized and valued by that culture.

[x] The period after the Discovery of America (1942) and the following Conquest around 1500 is known as the Colonial era. Due to the arrival of different cultures to America (Spanish and African in the case of Latin America), a process of cultural exchange began (although the native culture suffered periods of devastation) that resulted in permanent artistic and religious expressions (Cited in Keen and Haynes, 2009).

[xi] There are two approaches to distinguish between the types of affective states: intensity and origin. This investigation focuses on Desmet's research regarding origin due to the purpose of studying emotions towards products. Within the origin, two subcategories can be studied: intentionality (implies a relation between object-subject) and longevity (acute or dispositional and persistent). An example of these features to describe an affective state is that moods are not intentional (they are not directed to anything in particular), and emotional traits are part of the personality so they are persistent.

[xii] Although this research focuses on emotions, it does not implies that other affective states are not to be taken care of when analyzing human behaviour.

[xiii] Emotion can be considered the outflow of a module serving the regulation of activity for safeguarding the satisfaction of the individual's major goals or concerns (Frijda, 1988). This is why, although the process that awakens emotions is the same, the result may vary, this is the subjective feature that explains why the same product may result in different emotions for different people.

[xiv] Although there are different laws described by Frijda, only the ones pertinent to this research on cultural values and emotional design will be addressed. The laws of hedonic asymmetry, closure, care for consequences, and lightest load and greatest gain will not be explained.

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ESTABLISHING DESIGN THINKING AS A THIRD CULTURE IN LEARNING AND CREATIVE ENVIRONMENTS

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Design and design thinking are part of a third culture separate from the sciences and humanities. The paper will reposition design thinking within key philosophical and educational models. I will illustrate how design thinking as a method, process and approach can be taught through a focus on project based learning, innovation, a redefinition of technology and the integration of Participatory Action Research objectives and participant observation methodologies.

Keywords: Design Thinking, Education, Third Culture

INTRODUCTION

Firms and organizations can benefit from learning to be more design-oriented. Martin (2005) observed that design studios operate very differently from traditional business firms. He discovered that designers, constantly work toward deadlines with set timeframes and recognize the impermanence of the work they create. Martin also noted a high level of collaboration within design studios, the use of abductive reasoning (*guessing*) and a focus on possibilities rather than limitations when problem solving. The products and artefacts that designers create are readily understood and appreciated by users, but the ways in which designers define what they do or how they think remains a mystery to non-designers.

The meanings associated with the terms design and design thinking, are continually debated, contested and expanding. They are terms that are associated with how individuals interact with their environment, create change and develop consciousness in others. Buchanan (1992) broke up the term design/designing into four very broad areas of exploration. These areas include: symbolic and visual communication; the design of material objects; activities and organized services; the design of complex systems or environments for living, working playing, and learning. Buchanan also advocated that these areas should not be linked only with specific professions such as graphic design, industrial design, engineering and management. Buchanan (1992:10) claims that design is closely tied to 'human experience in contemporary culture' and that all of these professions are interconnected with each other. Based on Buchanan's expansive views on the areas of design it can be determined that design thinking defines methods, processes and planning approaches that aid in understanding a problem, acquiring knowledge and information, sharing and adopting other's perspectives, problem solving through creative action, offering solutions and the analysis of project outcomes. Design thinking has also established itself as a way in which to develop a product or

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communicate a message and has expanded as an approach to offer better services to clients and create more effective business models.

This paper will promote design thinking as a third culture separate from the sciences and humanities. I will acknowledge that design thinking has a separate history of development from the sciences and humanities and reflects perspectives and understandings that are not limited by previously defined educational viewpoints. Much of the current research and understandings about design thinking examines case studies that do not elaborate enough on how design thinking can be taught. I will illustrate how design thinking as a method, process or approach can be learned through project and team based learning, a focus on innovation, redefining the use of technology in project development and the incorporation of Participatory Action Research (PAR) objectives and participant observation methodologies.

THE THIRD CULTURE OF DESIGN

Design and design thinking are closely associated with industrialization and the explosion of design activity in the 20th century. Rowe (1987) first applied the term design thinking within the field of architecture in his book **DESIGN THINKING**. Rowe examined a number of architectural and urban planning case studies and chose to examine interior situational logic, decision-making and how theory is applied in a design project. Rowe's thoughts on design thinking although instructional in architecture and urban planning did not address educational models within the sciences and humanities. To better understand design thinking it would be helpful to understand how design thinking developed and distinguished itself from the sciences and humanities.

The incorporation of design thinking within education developed because of a lack of communication and exchange between the sciences and humanities. There was a growing realization that traditional models of learning were not sufficient in working with a material world mediated by technology. The British scientist and novelist C.P. Snow (1990) in an influential Rede Lecture in 1959 first articulated a split between the sciences and the humanities. Snow expressed a separation between literary intellectuals and scientists, most notably scientists interested in the physical sciences. Snow (1990:169) claimed '…between the two a gulf of mutual comprehension—sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding.' Snow later optimistically introduced the idea of a *third culture* that could mediate and close the gap between literary intellectuals and scientists.

Brockman in his book **THE THIRD CULTURE** attempted to articulate many of Snow's ideas about a *third culture* and went on to recognize a shift within intellectual communities towards a very public third culture. Brockman (1995) saw that the intellectual debates within the sciences and traditional intellectual circles were now open to a public narrative and dialogue arguing topics as diverse as artificial intelligence, chaos theory, biodiversity, the human genome, nanotechnology and virtual reality. New, emerging intellectuals and influential thinkers within the third culture that Brockman described synthesize, publicize and communicate their ideas affecting both global and generational change. Brockman's examples however, did not include the material culture of the world of design.

Design is viewed by many notable scholars and theorists including, Archer (1979), Cross (2001) and Buchanan (1992) as a third culture. Archer understood the relationship of architecture, engineering, art and design to a material culture of human activity that manipulates the world around us. Archer argues that

> …design in its most general educational sense where it is equated with Science and the Humanities, is defined as the area of human experience skill and understanding that reflects man's concern with the appreciation and adaptation of his surroundings. *(Archer, 1979:11)*

Archer understood that design and design thinking are very different from the sciences and humanities and provided practical applications that could not be resolved through the

understanding, valuing and manipulation of words and numbers. Archer claimed that there was little research on design as a phenomenon and activity, and advocated the presence of design awareness and education in secondary education. He wanted to move away from joint projects within art and science classrooms and the teaching of traditional crafts. Archer (1979:20) also wanted to impose qualitative considerations within the pursuit of design awareness that covered aesthetic, ethical, social and ideological considerations.

Cross defined design as separate from the sciences and was aware of a push to *scientise* design during the early twentieth century. By charting the development of various design methodologies from the 1960's – 1990's Cross was able to warn that

> …method may be vital to the practice of science (where it validates the results), but not to the practice of design (where results do not have to be repeatable, and, in most cases, must not be repeated, or copied. *(Cross, 2001:51)*

Rather than a focus on a *design science* advocated by Gregory (1966) and Grant (1979) Cross claimed that design as a discipline has it's own culture and that there exists '…forms of knowledge special to the awareness and ability of a designer, independent of the different professional domains of design practice.' (Cross, 2001:54) Cross believed that designers work in a manner different from traditional intellectuals and scientists, within an artefact focused, human-made, artificial world. He determined that designers acquire knowledge through the act of designing and the creation, use, reflection and instruction of artefacts,

Buchanan moved the role of designers and the discipline of design away from limitations set by chosen materials, media or *applied* outcomes. He claimed that there are 'places of invention shared by all designers, places where one discovers the dimensions of design thinking by a reconsideration of problems and solution' (Buchanan, 1992:10). Buchanan saw design and design thinking as a non-linear process not bound by an area of inquiry or subject matter. Buchanan pointed to a *fundamental indeterminacy* to design problems. Designers create subject matter through the problems they face. Through a process of reflecting, experimenting and finding interconnections between what is being communicated, formed, used or considered, a designer presents a solution that transcends circumstances and fulfils a need.

Design thinking is not bound by a systematic way of thinking or fixed worldview more prevalent in the sciences and humanities. Design thinking requires flexibility in thought and action often working with confusing, conflicting and ill-formulated issues first framed by Rittel (Churchman, 1967) as *wicked problems.* Wicked problems are problems where a solution does not exist, have a set formulation, point of termination, set of operations, explanation, definitive test or right or wrong answer. Design thinking does not exist in conditions where you simply test a hypothesis until you arrive at a clear solution. Design and design thinking allows individuals to problem solve within social and cultural conventions. Design thinking allows the transformation of a problem to an improved state, moving across many disciplines, professions and conceptual frameworks.

TEACHING DESIGN THINKING

Teaching design thinking requires a perspective that is not tied to traditional educational models within the sciences and humanities. The sciences offer explanations and predictions through logical, rational and empirical forms of thinking. The humanities often focus on analytical, critical and speculative forms of thinking. Both the sciences and humanities emphasize the memorization of facts and the building of knowledge. Design thinking is a creative and productive approach that is very fluid and not tied to set understandings and focused on the application rather than accumulation of knowledge. There are a number of approaches that need to be incorporated in teaching design thinking. These ideas include an approach that is project and team based and promotes an accommodating learning style, focusing on innovation and expanding an understanding of technologies used in developing a project. Participatory action research objective

and participant observation methodologies in the research and analysis of a project can develop better communication between researchers and project participants.

TEAM AND PROJECT-BASED LEARNING

Project and team based learning is a key condition in creating effective design thinking. Brown (2008) noted the lessons that could be learned from examining Thomas Edison's R&D laboratory. Edison's laboratory was a creative and productive space and Edison's greatest achievement may have been '…his organization of the invention process itself.' (Hargadon, Yellowless, 2001) Thomas Edison was marketed as a brilliant and successful lone inventor but without the help of a team of scientists and inventors he would not have created or developed most of his greatest works. Within any team each member has a role and through experience and an active engagement with a problem or issue each team member can make a contribution in developing solutions. Team members however, may have different learning styles and it is important to recognize these distinctions.

Kolb (1984) developed an experiential learning theory split into four distinct learning styles: diverging, assimilating, converging, and accommodating. Individuals employing diverging style are good at generating ideas. Individuals that use converging style are able to better complete technical tasks over tasks requiring the navigation of social or interpersonal issues. Individuals using assimilating style are able to logically order information and individuals using accommodating style prefer to work with their hands and work best within action-oriented learning. Beckman and Barry (2007) concluded that accommodating style learners are the most helpful team members within a group because of their ability to create solutions. Beckman and Barry also claim that

> *Concrete experience and active experimentation are the dominant learning abilities of people with the accommodating learning style. They tend to learn primarily from 'hands-on' experience and act on their 'gut' feelings.* (Beckman and Barry, 2007:44)

In developing project teams individuals who exhibit an accommodating style should be identified and this learning style promoted. Solution based learning should be stressed rather than styles that focus on ideation, technical aptitude and organizational skills. Intuitional risk taking or the *gut feelings* Beckman and Barry (2007) describe should also be promoted to better follow a line of thinking that may produce more experimental and experiential processes and outcomes.

PROMOTING INNOVATION

Innovation is a key aspect of design thinking that should be promoted throughout a projects development. Brown (2008) writes of the importance of innovation. He argues that 'Leaders now look to innovation as a principal source of differentiation and competitive advantage; they would do well to incorporate design thinking into all phases of the process.' (Brown, 2008:2) Research and development traditions in such notable companies such as AT&T, Du Pont, General Electric, Kodak, RCA and Westinghouse have long been studied and point towards the importance of innovation as a key aspect of Research and Development (R&D) branches within these companies (Smith, 1990). R&D areas in an organization often fought for autonomous control in the type of projects they undertook and the ways in which they would operate. Through the development of new products, ideas and processes companies moved away from a traditional corporate strategy in which innovations were exploited outside of a company. Companies searched for new ideas and breakthroughs achieved by individuals or teams acting as free agents independent of an organization. Historically, companies sought to protect and improve upon current product lines and did not fund research and development internally. Some of the greatest innovations within the last century such as the atomic bomb, penicillin, radar and synthetic rubber occurred during WWII because of an initiative within the government to support R&D activities and the creation of markets that would use the products that were created (Smith, 1990:126-127).

REDEFINING TECHNOLOGY

Technology has always been linked to design and design thinking. It is through scientific breakthroughs and the use of technology that designers are often able to establish new approaches in interacting with our environment, communicating with others and, perceiving our world in new ways. Buchanan notes the expansion of design into a profession and area dependent on technology.

> …for we have seen design grow from a trade activity to a segmented profession to a field for technical *research* and to what now should be recognized a new liberal art of technological culture. *(Buchanan, 1992:5)*

Buchanan's thoughts on technology were inspired by the writings of the American philosopher, psychologist and educational reformer John Dewey. Buchanan (1992:19) argues '…most people continue to think of technology in terms of its product rather than its form as a discipline of systematic thinking'. The use of technology in a project should not be tied to the manipulation and creation of hardware and software but as a mode of thinking that develops incrementally through an expressive ideational process. Modelling, prototyping and the notations of ideas employing a variety of media and materials are part of design thinking and offer opportunities for new directions, growth and reflection in a project.

To be able to produce an effective outcome, quick and expressive forms of prototyping are essential in the creation process. In a study of the design practices of the renowned architect Frank O. Gehry it was revealed that Gehry actively created multiple physical models made from various materials, scales and at different stages of development (Boland, Collopy, Lyytinen,Yoo, 2008). Gehry incorporated models, sketches, drawings, and three-dimensional computer renderings throughout the process of creating a design. He attempted to evoke an emotional quality in his work and express human experience. Expansive prototyping such as the forms created by Gehry range in format, media and expressive qualities in order to provide inclusive and varied voices that could engage more members of a team and offer richer perspectives and formats in presentation to viewers

Effective and productive communication with team members in a project is essential in creating outcomes that include more involvement by members and address many of the objectives and goals of a project. The engineer and educator, Bucciarelli (1994) wrote the influential engineering textbook **DESIGNING ENGINEERS** and is interested in the relationship between engineering design and ethnographic studies. Bucciarelli argued that design is a social process where design decisions are negotiated by team members he defines as *participants*. Each participant brings in skills and perspectives that frame their understandings of a project. Project outcomes result from reaching a common ground rather than a summarizing of ideas. Bucciarelli's ideas point to the benefits of an ethnographic perspective in the design thinking process and reflect on participant relationships.

PARTICIPATORY ACTION RESEARCH AND PARTICIPANT OBESERVATION

Participatory Action Research (PAR) is a form of experimental research that promotes improvements in the interactions and performance of a participatory community. PAR is a collaborative and self-critical learning process and approach. Participant observation is a research strategy used in many fields of research such as communication studies, cultural anthropology, sociology and social psychology. Participant observation tries to create a picture of a social system and finds meaning through conversations, encounters and situations. PAR objectives and Participant observation methodologies can be incorporated in the design thinking process to improve the communication strategies among project members, as well as the research, development and analysis of a project. PAR began within the field of social psychology and its purpose is to advance scientific knowledge and develop practical objectives. PAR research can combine participant observation methods with a commitment to incorporate active participation in

the research process. PAR is a collaborative and creative approach that focuses on creative problem solving, using both a flexible and reflective attitude. The PAR view appreciates subjective reflection as a way to improve the analysis of information and respects intuition and epiphanies in the creation process. Participant observation methodologies provide directions and tools to record, reflect and relocate ideas.

PAR objectives are often readily accepted by researchers and participants, who are motivated by a project that allows individuals to make connections to their communities, provide flexible research methods and a sense of ownership derived from validating the unique perspective of all members involved in a project. Participation observation methodologies can be used in design thinking to develop a deeper understanding of the cultural influences, individuals, sites and communities in a project. Examining institutional theory informs us that

> *…organizations, and the individuals who populate them, are suspended in a web of values, norms, rules, beliefs, and taken-for-granted assumptions, that are at least partially of their own making. These cultural elements define the way the world is and should be.* (Barley, Tolbert, 1997:93-94)

Examining the cultural elements that form an individual provides a richer understanding of what motivates and forms an individual's decision-making. Informants and collaborators in projects should be considered as *participants* and through this interaction, points of discovery can be made and a course of action determined by researchers and participants.

Levels of observation and participation can range in any research project and understanding how involved researchers are with their participants is an important factor in the success of a project. Spradley's (1980) typology of the *degree of participation* articulates levels of interaction and when and where participation occurs. The four participation levels include: nonparticipation, moderate participation, passive participation and active participation.

> Nonparticipation: observations are made outside the site of research.
>
> Passive Participation: observations are made at the site of research with minimal interaction with research participants.
>
> Moderate participation: observations are made at the site of research with occasional or temporary interactions with research participants.
>
> Active participation: observations and cultural understandings are made at the site of research with as much interaction and active participation possible in the daily activities of research participants.

By determining participation levels in a project, researchers are better able to understand the levels of access they have to information from individuals who directly use the artefacts they are trying to create or processes and methods they are attempting to improve. Objectivity of researchers can also be determined by looking at levels of participation and any biases that may be observed. Participants should be seen as part of a community of participants and observations made at sites of research note conditions related to every day activities and interactions with other individuals in a community.

Language usage is an important aspect of participation observation methodologies. Examining textual information from participants although valuable in the documentation process does not put enough value on what can be learned from informal conversations. The observation and recording

of casual interactions between participants may articulate issues and developments that would not be seen as worthy of documentation. Every organization develops its own vocabulary that is commonly used by members to facilitate faster and more informative communication. Examining the design practice of Frank Gehry revealed the importance of examining language in an organization and how it can affect change. The researchers Boland, Collopy, Lyytinen and Yoo (2008) claimed that in Gehry's design practice an organizations' familiar language

> *…will be subject to scrutiny, and that new vocabulary elements are expected as an emergent outcome of seeking to create a more desirable state of affairs. If the designing is successful, it will change the language that they and others use to approach the world. It will introduce new vocabulary elements that enable new possibilities for making meaning, and for making lives meaningful in the world.*
> (Boland, Collopy, Lyytinen, Yoo, 2008:22)

Designing to Gehry offers the potential for new perspectives and understandings. Language is seen as a significant part of design thinking. Language however, should not be viewed as just words but should include visual forms of communication, procedures, customs and perceived attitudes participants and organizations may have while being observed. Holding to understandings, goals and strategies for a project using the language familiar and easily interpreted by a researcher can create work that is both limited in scope and direction.

Participant observation methods promote the challenging of conclusions and their validity to an audience. Researchers should be encouraged to note patterns and inconsistencies in collected information as well as examine evidence that does not support their ideas and develop alternate project viewpoints. Through a more formal analysis of findings that determine participation levels and are critical of language usage, projects may move towards different conceptual directions and identified connections between the researcher and their findings.

CONCLUSION

An active dialogue about design thinking is essential in allowing it to evolve beyond a term that covers so many different areas of exploration and application. Examining the development of design and design thinking as distinct from the sciences and humanities removes an attachment to histories and priorities associated with traditional educational models. Design thinking can be defined as a third culture separate from the sciences and humanities with different approaches and processes in handling subject matter. Design thinking should involve project-based learning and focus on accommodating learning styles. Design thinking requires an innovative focus in order to create relevant and useful outcomes to an end user. The inclusion of technology appropriate in the development of a project must expand into applying diverse forms of modelling, prototyping and sketching. The research process in design thinking can be inspired and better mediated by Participatory Action Research objectives and participation observation methodologies. Determining the levels of participation in a project can promote utility and objectivity in the research process. Language usage is a significant aspect of research and should be closely examined in a project to create change and open project opportunities.

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SENSE AND SYMBOLIC OBJECTS: STRATEGIC SENSEMAKING THROUGH DESIGN

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This paper reports on an ongoing investigation into one aspect of the design thinking phenomenon, namely the use of designed artifacts — sketches, renderings, graphics, models and prototypes — as symbolic objects in strategy making and implementation. It examines the conceptual overlap between design and the strategic cognition perspective, which considers cognitive processes and structures involved in strategic decision making, particularly the phenomenon of sensemaking. It is primarily a theoretical exploration, but draws on two short testimonies from designers. The specific conceptual connection between design practice and strategic cognition theory is potentially valuable to business leaders and managers involved with innovation, design management and strategic decisions.
Preliminary findings suggest sensemaking activities by designers generate innovative future concepts with far-reaching strategic implications; designed artifacts aid sensemaking and sensegiving by management in exploring new business opportunities and directions.
This paper is an early draft of a fuller account to be published in 2013 (AIEDAM Special Issue, Spring 2013, Vol.27, No.2, Studying and Supporting Design Communication, Edited by: Maaike Kleinsmann & Anja Maier).

Keywords: strategy, sensemaking, symbolic objects

BACKGROUND

Recognition of value added through design is long-standing and quite comprehensive, having first focused on design in the product context, then growing to encompass marketing and branding, and ultimately including the organization and society (Cooper, Junginger, & Lockwood, 2009). Cooper & Press (1994) suggest that designers contribute in three key operational areas, the design of corporate identity, saleable products, and of operating environments (see also e.g. (Hayes, 1990; Olson, Cooper, & Slater, 1998; Phillips, 2004).

The subject of this paper lies in the third, organizational context, as it refers to the use of design approaches to aid strategic decision making and implementation. Proponents of design thinking argue that methods and tools of designers can help understand and tackle complex challenges, where analytical approaches alone are inadequate, including strategy (see e.g. (Liedtka, 2004; Brown, 2008; Cooper et al., 2009; Lockwood, 2009; Martin, 2009)). One defining characteristic of these design approaches is the representation of concepts through designed visual or physical artifacts. Key texts in design thinking literature such as those above stress the importance of visualization for common understanding and decision–making among stakeholders, including non–designers. So what is so special about visualzation? Is it axiomatic that 'seeing is believing', that a rendering, storyboard or model brings an idea to life? Perhaps, and in simple situations this is

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enough of an explanation, but this catch-all term of visualization spans several layers of complexity. At its simplest we might think of the way a chart or infographic renders complex data comprehensible. This is very different from the creation of artifacts that articulate and express meaning and emotion, not merely information. In product terms, a convincing prototype through being experienced conveys knowledge and meaning in ways unsayable in words or numbers*. In organizational terms, designers may create a representation of something more abstract than a product or service (such as the changing identity of a firm), in order to build a shared understanding or a vision of a future possibility. Such practices are reported from industry (Stevens & Moultrie, 2011), but how does such a fuzzy, speculative activity sit in the world of corporate management and strategy, where process efficiency and reliability are supposedly the rules of the game? Do the claims of the design literature square with current ideas in strategy? This is the crux of this paper but before I come to it, a brief diversion is necessary for a short summary of a large topic.

STRATEGY–AS–PRACTICE, SENSEMAKING AND SENSEGIVING

Since Mintzberg (1994:321) debunked the notion that strategy can be planned, 'strategy–as–science' dominant through the twentieth century is being challenged by an approach which pays closer scrutiny to how strategy work is actually done by people (Whittington, 1996), and accounts for "organizationally situated managers, widespread uncertainty, and poorly defined problems with unknowable social and economic consequences" (Powell, Lovallo, & Fox, 2011). The strategy–as–practice† school explores how strategy emerges from the interactions between actors and their contexts (see e.g. Johnson, Melin, & Whittington, 2003; Jarzabkowski, 2003). Within this school, behavioral strategy applies cognitive and social psychology, grounded in "realistic assumptions about human cognition, emotion, and social interaction" (Powell et al., 2011). Strategic cognition considers the cognitive structures and processes involved in diagnosis, decision making and implementation (Narayanan, Zane, & Kemmerer, 2011), which include sensemaking and sensegiving (Daft & Weick, 1984; Weick, 1995; Narayanan et al., 2011).

There are varied definitions of sensemaking (Weick, 1995), though broadly it is taken to mean the process of giving meaning to experience, by mentally placing elements of that experience (such as observations or data) in a framework or cognitive map. This enables one to "comprehend, understand, explain, attribute, extrapolate, and predict" (Starbuck & Milliken, 1988), to understand connections among, e.g. people, places, and events (Klein, Moon, & Hoffman, 2006), or to explain surprises or discrepancies. Sensemaking is triggered by disruption, a deviation from the expected (Weick, 1995:5), which might be noticed through a deliberate or formalised activity of information gathering or scanning (Daft & Weick, 1984). In the strategy context this means being attuned to changes in external and internal environments that might affect future performance. (Gioia & Chittipeddi, 1991) argue that through sensemaking, stakeholders grasp a firm's internal and external environment and redefine the way they conceive the organization — a crucial process for strategic change. Notably, it is not only senior executives but multiple stakeholders who shape this change.

The outcomes of sensemaking – such as judgemental decisions to enact change – may then be articulated and given meaning to facilitate interpretation by other stakeholders; this is termed sensegiving (Gioia & Chittipeddi, 1991; Dutton & Ashford, 1993; Gioia, Thomas, Clark, & Chittipeddi, 1994). Through sensegiving, strategic intent is framed and disseminated to ensure all constituents understand and accept the changes, and this collective buy-in is essential for the changes to happen (Fiss & Zajac, 2006). Instrumental in this are the "symbolic constructions used

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* This of course is one of the main reasons for prototyping; creating renditions of a product permits the testing and development of an idea with a view to taking it to market. In the new product development (NPD) process, prototyping is crucial and well documented, and parallels are seen more recently in service design (Kimbell, 2009).

† It is interesting to note the similarity here with the shift from design-as-science to design-as-discipline that happened decades earlier, as outlined by Cross (2001).

to create meaning for others (i.e. to give sense)" (Gioia & Chittipeddi, 1991), including a "captivating vision…[which] provides a symbolic foundation for stakeholders to develop an alternative interpretive scheme". Through sensemaking and sensegiving, middle–level managers and other constituents can influence strategy making (Dutton & Jackson, 1994; Dutton, Ashford, O'Neill, & Lawrence, 2001). I suggest that these other constituents might include designers, whose skills and methods are well suited to helping build and convey these symbolic constructions and captivating visions as artifacts.

WHY DESIGN?

So what makes design (and designers) so able to contribute to these sensemaking and sensegiving processes? Are designed artifacts capable of such symbolism? Designers and design researchers describe design as "a way of organizing complexity or finding clarity in chaos" (Kolko, 2010). It is recognised that visual and physical artifacts are valuable for conveying tacit meaning (Polanyi, 1967), and as boundary objects (Star & Griesemer, 1989; Carlile, 2002) which can aid knowledge transformation across boundaries of understanding, where actors negotiate their differing interests and cognitive frameworks (Carlile, 2004). Eckert & Boujut (2003) characterise boundary objects in design as including any physical and virtual artifacts (sketches, technical drawings, models and prototypes) "that can convey meaning in interpersonal communication, but have an existence beyond a single act of communication." They serve as reference points but may be understood differently by the different participants: "many design processes depend on the different participants interpreting boundary objects not in the same way but in compatible ways" (Eckert & Boujut, 2003).

I suggest that the designed output is a symbolic embodiment of the designer's or design team's sensemaking, both in a personal sense, and on behalf of their employer or client. This symbolic embodiment may be then be key in sensegiving, influencing sensemaking by others engaged in strategy.

What all this points to is the existence of a type of designed artifact which is not directly part of the NPD pathway, which may not see light of day outside the firm, which is not widely discussed explicitly in literature or industry, and yet has high value and impact on the firm's operations and strategy. Such artifacts, visual or physical, are created as part of strategic sensemaking and sensegiving within the business or in the stakeholder network.

EXAMPLES

To illustrate this idea, I include short excerpts from interviews with two designers carried out as part of a series of case studies*. Both respondents recount designing artifacts that were not intended for the market but were for internal use, and had a strategic influence. They are suggested as possible examples of design contributions being made in sensemaking and sensegiving activities at various levels. I make no claims of randomized or representative sampling, or of proving any hypothesis, but present them as illustrations of why the idea is worth further investigation.

ANDY

Andy works for a large European firm that designs and manufactures mobile phones and devices, employing several hundred industrial (product) designers and interaction designers in London. He is head of the firm's mid–range design strategy team, and has about 20 years' industry experience. Andy describes how product prototype models are increasingly used to represent the firm's future

* Interviews in 17 UK firms were carried out from 2007 to 2010 with designers, product managers and others in senior design–related roles exploring the various strategic impacts of design. Deep case studies were made of two of these firms. For further methodological details and findings see (Stevens & Moultrie, 2011). Seeking to clarify these internal roles in terms of cognitive strategy, interview transcripts were revisited for a second analysis according to themes derived from the key texts (especially Daft & Weick, 1984; Weick, 1995; Dutton & Ashford, 1993; Narayanan et al., 2011), that is, related to sensemaking and sensegiving, to strategic decision making, long–range planning, and key words like change, complexity, future, symbols, visualisation, vision, and communication.

portfolio; in the past decisions were made by the Business Planning department, mostly on the basis of technical and functional specifications. The subtleties and nuances of the various products cannot be captured or communicated in a spreadsheet of specifications adequately enough to convey the direction in which they would take the firm.

> *On a spreadsheet it looks very similar but actually the designs are very different, so they are not similar products in terms of how people would respond to them… We are helping the business understand the market in more emotional terms. (Andy)*

The models collectively act as a boundary object that is part of a process among top tier managers and senior executives which builds consensus and facilitates decisions:

> *It's about helping the business get clarity of what [the business itself] is going to look like in 5 years. When we laid them all out on the table we could say well, that's pretty much what our portfolio is going to look like. (Andy)*

Secondly, they achieve a symbolic meaning, representing a strategic objective or mission, a shared vision for the future across professional domains, geographies and cultures:

> *It's the only time that everyone really gets what you are talking about, or they understand it in their own terms… If it's on a spreadsheet or in a strategy document no one really actually has a passion around it, and the best thing we can do is design something that people like, they all get behind it… And then that gives something palpable, something that we can talk about, particularly in global companies where you have lots of different people speaking different languages, different cultures and reference points. (Andy)*

Designers' activities make tangible the diverse business, market and technological requirements. Top tier and mid–level managers including Business Planning and Brand Management use designers' artifacts (prototypes, models, graphic boards and simulations) in building consensus and aiding decision making. Top tier and mid–level managers use designers' artifacts to 'build up passion' around a strategic vision for other constituents.

DAVID

David is a director of a London–based product strategy consultancy employing a dozen or so people, mostly designers but also researchers. He trained and works as a designer, and has about six years' experience in the industry. The company advises its clients on design–related strategic issues such as market positioning, portfolio planning and 'product vision' – what they regard as the front end research of the product design and development process. Most of their clients have their own in–house design and R&D teams and a network of external design and research agencies. David believes one of the firm's key strength is in synthesizing and conveying complex research in rich, meaningful, visually sophisticated communications.

> *We help develop processes, and frame problems to come up with recommendations about what they should do next… A lot of our clients say we bring rigor to something inherently subjective…What people value is our ability to analyse, structure and synthesise complex issues, then communicate them in a really engaging way. So it's a real use of design skills at that end, creating an engaging artifact, whether that's a book, [a movie,] or a CD or report. (David)*

Like the previous example, the artifacts involved include product mock-ups, but also more abstracted narrative representations. One such is a magazine mock–up which they created to help a client make use of market segmentation data, which is often dense, quantitative, and hard to

make sense of. They were tasked with transforming research findings into a visual form for the client's own designers, who would then execute the detailed design work:

> *We might do more qualitative research [into] attitudes and behaviours… then synthesise that to bring it to life. Our output could be a physical printed book, it's very editorial, as if in the style of the magazines that those people would be buying. Making it as visual and tangible as possible but bringing in data where necessary… We place a lot of emphasis on the media we produce, even if it is about higher level strategic recommendations, it is not in the form that people usually receive that sort of thing. (David)*

The point here is that the client is not in the magazine business; the mock-up format is carefully chosen and executed to frame and give sense, to embody and convey subtle and complex meaning with immediate impact "across silos… into the hands of others in order to use it." In other examples product mock-ups are created, but are still somewhat abstract, in that they are not proposals for actual products but are created to symbolise a long–term possibility or objective, or 'product vision'.

> *We sometimes work with [other designers] to articulate this end game, this product vision – it's not really what it will look like, but a manifestation of that strategy we've plotted out. So, if we get all that in place, this is where we could end up, what it might look like. It's something to work towards, a sort of motivating tool for people to use. It also gives people a sense that their work is part of something bigger… Or it can be internal tool for people to say 'look this is what our brand is all about, what we should be fighting for'. (David)*

Like a concept car, these artifacts are never intended to go into production. They are symbolic or emblematic of a future identity of the firm, and give sense to the unknown future, to the company vision, and to employee purpose and belonging (hence company culture).

> *Most of these companies have a corporate mission, a vision… but they are still at a very abstract level, they are just words. This [our work] makes it more touchable… It could be a model, an experience prototype, packaging, accessories, maybe screen mock–ups if there is any interactivity. It is not meant to be a design as such, more of a way of articulating a strategy. (David)*

The artifacts that David and his colleagues create visually articulate complex and uncertain contexts. Their clients use them to embody rich qualitative data and 'bring it to life', and as symbols of a product strategy vision, for other constituents within and outside the (client) firm.

CONCLUSION

While they may not be typical or representative, both examples suggest roles for designed symbolic objects in strategy which might be described in terms of sensemaking and sensegiving activities, including the following:

- 1) Designers' sensemaking and sensegiving activities interpret, combine and synthesise from diverse contexts, generating artifacts that symbolise complex and uncertain contexts, future concepts or objectives.
- 2) Top tier managers and executives use artifacts in sensemaking, building consensus and aiding decision making around new business opportunities and directions.
- 3) Senior managers use artifacts in sensegiving, to embody rich qualitative data and 'bring it to life', aiding sensemaking by constituents in other operations and as symbols of a strategic vision, to 'build up passion' around a strategic vision for other constituents.

The artifacts described by the designers are important not for their manifest function (as a magazine, smart phone or whatever) but for their symbolic function, which may be regarded as a socially constructed 'status function' (Searle, 1995; See also Crilly, 2010 for a synthesis of theories of artefact functions). Like a concept car, they must be plausibly designed as if for an end user or customer in order to perform their symbolic purpose*.

This duality raises an interesting question: do the designers design for the imaginary phone user / magazine reader, or for their audience of managers and other stakeholders? I suspect that the answer is both, at different times in the process, and that he/she can never lose sight entirely of either.

Any mention of designers and design is rare in strategy discourse, except concerning the market-facing aspects of product and brand. Should the strategy-as-practice remit include this kind of design activity? Would such recognition increase its usage in industry? Designers might make a more credible case for strategic–level involvement, and engage more explicitly in symbolic sensemaking and sensegiving activities. Managers and strategy may see new potential for design in strategy activities they previously never thought relevant.

Based on empirical research literature, illustrated with quotations from designers, I suggest that designed artifacts may be valuable symbolic resources, with a role to play in strategic sensemaking and sensegiving. There is plenty of discourse and empirical literature on the characteristics and value of designers' visualization and modeling as ways to explore, communicate, and test possibilities (see Lawson, 2004 for a summary). This tends to focus on the 'typical' design process, where a team of designers responds to a brief from a client to meet a market demand. I have focussed here on the less typical, under–examined design activities that are not directly concerned with a marketed product. The less recognised role of designed artifacts in sensemaking and sensegiving should be examined further, to better characterise the way it is done, its recognition among practitioners, and its value, impact and influence. It is a broad topic, and this work–in–progress only scratches the surface.

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* In this respect (but few others), this activity might be comparable to design–as–critique, or critical design, as exemplified by Dunne and Raby (Dunne, 1999; Dunne & Raby, 2001). Critical Design similarly balances on the line of plausibility in order to challenge and provoke: "too weird and it will be dismissed as art, too normal and it will be effortlessly assimilated." (Dunne & Raby,).

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Natalie Wright, Cara Wrigley, Sam Bucolo. (2012). *Broadening Horizons: An emerging research agenda modelling design led innovation across secondary education.*

BROADENING HORIZONS: AN EMERGING RESEARCH AGENDA MODELLING DESIGN LED INNOVATION ACROSS SECONDARY EDUCATION

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A re-examination of design education at all levels is needed to ensure global economic competitiveness and social and environmental sustainment. This paper presents an emerging research agenda modelling design led innovation approaches from the business sector to secondary education curriculum. To do this, a review of literature is provided and current knowledge gaps surrounding design education are detailed. A regional secondary school design immersion program is outlined as a future research case study using action research. A framework and recommendations for developing and delivering pedagogical approaches for 21st century skill outcomes in secondary education are briefly introduced and future research objectives are overviewed and discussed.

Keywords: Design Led Innovation; Design Thinking; Secondary & Tertiary Education

INTRODUCTION

It has been recommended that an urgent re-examination of design education at all levels is needed in order to safeguard a globally competitive design industry and to contribute substantially to social and economic revival in the United Kingdom. (Design Commission, 2011; Design Council, 2011). An international analysis of design education policy highlights Finland's *Design 2005!* program as a dynamic utilisation of design for national innovation (Design Commission, 2011:39). In 2005, C$40.9 million was invested (Macleod et al, 2007) in design research, education and promotion. This investment dramatically improved the country's global competitiveness and rated Finland as the top performing education system in 2006 (Ministry of Education and Culture of Finland, 2007) and in the top three for maths, reading and science in the OECD 2009 Programme for International Student Assessment (PISA) tests (OECD, 2010). Asia Pacific countries such as Singapore, Korea, Hong Kong and China are also actively realigning design education to ensure effective delivery of a workforce to support future industry innovation. These countries also rated amongst the top-performing school systems in the 2009 PISA tests (OECD, 2010). To ensure Australia remains globally competitive, a design led culture similar to the Nordic countries needs to be established. 'Design led' is defined by Bucolo & Matthews (2011:2) as having a vision for growth based on deep customer insights; expanding this vision through co-design with stakeholders; and mapping these insights to all aspects of the business.

Introducing design awareness at a school level and providing incentives for students and teachers to work across disciplines is needed to ensure future generations are empowered for

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business innovation and active citizenship. This paper provides a review of literature and highlights the current gaps in knowledge surrounding design education. It provides a framework for incorporating design thinking (as a generic capability) in secondary education. A research agenda utilising a design led innovation approach for business growth is used as a framework to help formulate potential future recommendations for curriculum advancement in secondary education. To do this, an Australian regional secondary school design immersion program is outlined as a future research case study using action research. Overall, this paper addresses an area of investigation that is largely, up until now, undocumented. It is anticipated that the findings of this research will encourage policy makers to see the value of design led innovation in the education sectors.

AN EVOLVING FIELD: DESIGN EDUCATION

The Centre for Educational Research and Innovation (2008:3) acknowledges that OECD economies require innovation to enrich mainstream practice and reform. They also need to ensure alignment of education with the knowledge economy and society of the 21st Century. This centres on capacities such as life-learning skills, creativity, and innovation. As design has been defined as the link between creativity and innovation (Cox, 2005:2), more recently, design thinking has been acknowledged by increasingly diverse professions and industry leaders as a wider strategy to enable innovation across all sectors, including education. This is evidenced in program changes at Harvard, Stanford, MIT and other top 50 ranked universities, and executive training in leading business organisations. Education sectors, including the secondary education sector, need to respond to this, ensuring that future business leaders and proactive community participants are equipped with the necessary skills and habits to sustain economic, social and environmental resilience.

Beckman & Barry (2007) advocate for the value of innovation as an experiential learning process of ‘problem finding/problem selecting, solution finding/solution selecting, or story-telling’ (2007:47). They state that the embedding of design thinking incorporates all four phases of an ideal learning cycle – experiencing, reflecting, thinking and acting. As opposed to the main focus of education today on problem solving, the innovation process places equal importance on identifying, framing and reframing the problem to be solved. It is also a learning cycle that draws upon the four learning styles of (i) diverging, (ii) assimilating, (iii) converging and (iv) accommodating. It allows the learner to experience their learning style preferences, and gain an understanding and empathy for the different personalities required to achieve innovation.

But how can the link between creativity, currently introduced in art education, be made to design, design practice and design value for innovation. How can this be translated in the education sector? To do this requires educators to shift their attention from ‘content delivery to capacity building, from supplying curriculum to co-creating curriculum, from supplying education to navigating learning networks’ and to shift student attention from ‘their own individual performance to their capacity to learn through their own networks – to connect, access information and forge relationships in and through dynamic and productive teams’ (McWilliam & Haukka, 2008:23). No longer is a risk-minimising, student-protective environment conducive to learning for optimising creative capacity.

Recent papers published by McGimpsey (2011) and Miller (2011) provide a review of design education in the United Kingdom National Curriculum since its establishment in 1988. They highlight that there is a surprising lack of evidence-based research on the impact of design education on national innovation and education systems. Florida (1999:28) states that ‘creative people are indeed the chief currency of the emerging economic age’. He maintains that creative capabilities are important vocational capacities in all globally competitive enterprises. If this is true, then a framework must be designed that engages on a political level and responds to economic growth imperatives, as well as educational objectives. It is clear that there is a need to address this evidence-based research gap. Developing student design thinking skills to foster creative and

innovative mindsets requires a comprehensive design led framework to be developed to allow prototyping and infrastructuring for social innovation across the education sector.

Bentley (2008:228) notes that Finland's high educational outcomes have not been driven by performance measures, standard templates, teacher accountability, or by prioritising test performance above all other aspects of learning. Instead, they have been achieved through the development of a set of institutional foundations that promote a 'culture of open, network-based interaction, symbolised by Nokia'. On this basis, Bentley (2008) advocates for open innovation. This involves new practices and models for schooling generated at a local level, and continuously adapted and tested via open collaborative learning networks with clear design rules and coordination systems. These models can then be incorporated into larger scale reform strategies (2008:206). This research proposes a model for design led innovation that has the capability to be tested through action research in schools, with a view to larger scale reform.

DESIGN LED INNOVATION IN THE CLASSROOM

Baghai, Coley & White (1999) describe a company's growth potential to be a function of three distinct phases or 'horizons' of product and revenue creation. Each phase must be managed simultaneously for effective innovation. This paper uses Baghai et al's (1999) framework in order to better understand a model for design led innovation that can potentially translate across educational contexts.

In Baghai et al's (1999) framework, Horizon One is defined as the core business of the current corporation, which usually accounts for the lion's share of annual revenue, profit and cash flow. Horizon Two includes the ventures in the entrepreneurial phase poised for rapid growth or the products just entering the market (with a long way to go before market maturation). Finally, Horizon Three contains the seeds for tomorrow's growth or the projects that are real investments and more than just ideas.

Just as these horizons represent the 'growth staircase' of manageable actions for business, parallels can be drawn to establish three horizons required for effective innovation in the classroom and the growth of the 21st century student. Carroll et al's (2010) research focuses on the role, impact and efficacy of design thinking within an urban middle school in the United Kingdom education system. It highlights three major themes of (i) Design as Exploring: Understanding Design, (ii) Design as Connecting: Affect & Design, and (iii) Design as Intersecting: Design Thinking & Content Learning. In this context, the 'Design as Exploring' theme could be categorized as the 'Horizon One' phase described by Baghai et al. (1999). This is where students explore and understand the design process while also mastering core subjects and 21st century themes such as global awareness and entrepreneurial, civic, heath and environmental literacy (The Partnership for 21st Century Skills, 2009: 2-3). The 'Design as Connecting' theme relates well with the 'Horizon Two' phase (Baghai et al., 1999). This involves preparing students for more complex life and work environments with creativity and innovation skills, critical thinking and problem solving skills, communication and collaboration skills, information, media and technology literacy (The Partnership for 21st Century Skills, 2009: 3-6), as well as metacognitive skills. Lastly, the 'Design as Intersecting' theme correlates with the Baghai et al's (1999) 'Horizon Three' objective. This consists of planting the seeds for tomorrow's growth by developing adequate life and career skills to empower utilisation of design thinking in life and work environments, including flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility (The Partnership for 21st Century Skills, 2009:6-7).

Mapping the efficacy of design thinking with the 21st century student outcomes provides a framework for the evaluation and continuous improvement of design thinking pedagogy in the classroom. However, in order for this framework to resist a linear approach to skill development and allow for more widespread and longitudinal data collection, it must incorporate the complexity of changing learning environments and the options for various intermediary social structures.

THE INNOVATION MATRIX

In *Navigating the Innovation Matrix*, Kyffin and Gardien (2009:57) propose that 'the scope of innovation has increased in complexity, where products, services, user needs and technologies need to be integrated while bringing many different stakeholders together'. They indicate that this therefore requires an alternative process of innovation as a network of options seen within a trajectory of three horizons of growth and utilised on a case-by-case basis, rather than the linear 'straitjacket' approach. Kyffin and Gardien's (2009) 'Innovation Matrix' emphasises that different competencies, capabilities and personal profiles are required for each phase and propose that the mechanisms of 'identifying value', 'developing value' and 'communicating value' are superimposed on the three horizons model to show a number of interesting and effective ways of capitalising on opportunities in Horizon Three.

In the quest for a design led innovation approach to the design education context, where Horizon Three represents the development of individual life skills beyond the classroom, enabling active citizenship and the navigation of complex environments in the globally competitive information age, this paper puts forth the proposition that the secondary education sector faces a similar landscape of complexity. McWilliam and Haukka (2008) note that creative capacity building requires a fundamental shift towards a more complex and experimental pedagogical setting. They indicate that this demands 'mutual involvement of teacher and student in assembling and disassembling cultural products designed to inform, entertain, subvert, problem-solve and inquire' (2008:21), drawing on a fluid network of people and ideas.

This has implications for the professional development of teachers. It will allow them to embrace new learning opportunities beyond the classroom, combining the rigour and depth of the best professional instruction with the flexibility and motivational power of community-based collaborative learning. Schools will need to 'transform themselves to become the hubs of learning networks….brokering learning opportunities with people and organisations in the communities around them' (Bentley, 1998:183). Therefore, a similar 'Innovation Matrix' should be constructed to allow innovation-generating possibilities in an open learning model, and to leverage future development in this sector. This new 'Innovation Matrix' needs to capture the potential variables of community, parents, design and industry professionals, business professionals, university instructors, tertiary design, business and education students, online tools and out-of-classroom activity.

KNOWLEDGE GAPS

A review of current literature surrounding the areas of design education; international design policy; creativity, design thinking and design led innovation in the education sectors; design thinking and design led innovation in the business sectors; and innovation in the education sectors, highlights a number of knowledge gaps. These gaps are summarised below:

- Design led innovation frameworks in the business sector have not been mapped across the education sector, and therefore literature on how to successfully implement design thinking across (and into) education is limited.
- There is a lack of systematic academic research surrounding the role of design thinking in educational contexts. The research to date has largely been driven by policy.
- There is no current research that addresses how design led innovation correlates to the development of the 21st century skills.
- There is no substantial current research on design led innovation in the secondary education sector. Academic research on design led innovation education in the tertiary sector is limited to business, science and technology and design. As a result, the value of implementing design led innovation in secondary schools and tertiary education sectors for future business success is, as yet, unknown.

- Creativity has become increasingly important within the wider secondary education discourse and now occupies a central position in definitions of curriculum design. However, the definitions of design, design thinking, design-led innovation and creativity in the education sectors are currently ambiguous and misunderstood.
- Research surrounding educational innovation has neglected to explore design led innovation as a strategy for aligning education with the knowledge economy and society of the 21st Century.

The summary of literature, indicates that in order for design led innovation to be successfully modelled in the secondary education context to build generic capability for future 21st century citizens, design led innovation in the business sector must be translated across to the education sector. From this, a framework for future action research can be developed.

FUTURE RESEARCH AGENDA

This paper has introduced a study that will extend current theory on design led innovation in a multi-disciplinary context using a case study methodology employing action research. The next stage of this research will examine, through an Australian case study entitled '*goDesign* Travelling Design Workshop Program for Regional Queensland Secondary School Students', the value of a design immersion program of learning activities introducing the different disciplines of Graphic Design, Fashion Design, Product Design, Interior Design/Architecture and Landscape Architecture. This program linked regional communities with tertiary design educators, visiting design practitioners and local industry professionals. The program was offered by the School of Design at Queensland University of Technology, Australia throughout 2010. It was a three-day supportive and interactive experience simulating a design studio environment. Up to 20 self-selected year 10-12 students and teachers from the six selected regional Queensland high schools participated. These include: Chinchilla, Mt Isa, Quilpie, Emerald, Gladstone and Bundaberg.

During the program, students and teachers explored, analysed and re-imagined their local town through a series of scaffolded problem solving activities around the theme of 'place'. Underpinning the program is the integration of Burnette's (1993) IDESiGN teaching model and a place-based approach that 'draws upon local cultural, environmental, economic and political concerns' (Smith, 2007:18).

Research outcomes from these workshops were derived from observation of student journals used during the three-day workshop, qualitative interviews with the school principals, participating school teachers and facilitators, and focus groups with the students at the completion of the workshop program. This qualitative data will be analysed within the framework of the proposed innovation matrix model for educational growth incorporating the three horizons. It is anticipated that the outcomes of this research will inform a successful design led education innovation model.

IMPLICATIONS

The potential implications of this research are significant and multifaceted. Firstly, this study will provide a new framework for curriculum involving design led innovation across the education sector. This will be achieved by providing a set of recommendations for pedagogical approaches to design in secondary education curriculum. This will ensure students are provided with opportunities to harness radical thinking, creativity and collaborative action to prepare them to model this behaviour in business, as well as enable them to become empowered agents to tackle future global social and environmental challenges. 'This vision involves shifting the way we see education from a separate sector of society to a culture which infuses every sector, linking together individuals, communities and institutions through diverse, overlapping networks of learning relationships' (Bentley, 1998:187).

Secondly, the research will highlight to what extent generic capabilities can and should be incorporated into secondary school education. Engaging the tertiary education sector, community,

industry and design professionals as part of a network or matrix infrastructure provides opportunities for non-linear multi-stakeholder engagement beyond the traditional classroom scenario.

Thirdly, changes to tertiary pedagogies for education of secondary teachers may require amendments to current teacher training to ensure the theories and practices of design led innovation are incorporated. For secondary teachers not trained in this area, professional development programs in design led innovation may be required and may need to be provided by the tertiary education sector. New models of engagement between the secondary education sector and the tertiary education sector in potential disciplines of business, education and design/creative industries, around the facilitation of design led innovation, are anticipated.

Finally, the integration of design led innovation in secondary education will require the development of new regimes for authentic assessment for creative capacity building – the capacity to engage in groups 'co-creating co-editing and co-evaluating in conjunction with each other and with staff', rather than the individual ability to memorise and regurgitate knowledge (McWilliam & Haukka, 2008:22) – in order for teachers to feel comfortable using this mode of learning.

SUMMARY

This paper presents the preliminary investigations into an ongoing research project aimed at modelling design led approaches from the business sector across secondary education curriculum. Through a review of literature, it was found that an urgent review of design education at all levels is needed to ensure effective delivery of a workforce to support future industry innovation for global competitiveness. Finland's *Design 2005!* program was highlighted as an exemplar of national innovation spanning all sectors and industries, showcasing the net benefits of design investment for economic growth and educational objectives. However, to date, there are no clearly defined frameworks or models for design led innovation in the education sector. Furthermore, empirical data surrounding design education integration in secondary school contexts is extremely limited. This means, prototyping is required to address the lack of evidence-based research on the impact of design education on national innovation and education systems. The next stage of this research will involve the analysis of case study data modelling design led innovation approaches across secondary education. This future research will detail the Australian regional secondary school design immersion program *goDesign* as a case study using action research. From this, a framework and recommendations for incorporating design thinking (as a generic capability) in secondary education will be developed.

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DEVELOPING DESIGN THINKING SKILLS IN ENTREPRENEURSHIP EDUCATION

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Authors discuss the merits of the Design Thinking methodology as a promising new method of teaching entrepreneurship. Design Thinking is becoming an important part of teaching practices at various levels of education. As recent studies indicate that teaching entrepreneurship is often ineffective and without satisfactory results, discussions about new and innovative methods have emerged. One of the methods put forward is the Design Thinking methodology which can be successfully applied as a problem-based methodology. We discuss the implementation of Design Thinking in an entrepreneurship class on an undergraduate level at the University of Ljubljana, using a series of exercises as a means of developing skills and mindsets. The approach is an upgrade of the existing system of business education developing overlooked entrepreneurial skills and mindsets.

Keywords: design thinking; entrepreneurship education; problem based learning

INTRODUCTION

Entrepreneurship education is regarded as one of the most important ways of increasing the number of entrepreneurs (Drucker, 1999) which are an indisputable source of social and economic progress and economic growth (H. Matlay, 2005). Due to the identified shortcomings of the existing methods of entrepreneurship education, scientific literature suggested a range of innovative approaches such as role playing, games and the implementation of start-ups for pedagogical needs (Neck & Greene, 2011). These methods experienced different levels of inclusion in teaching practice. One of the methods receiving increased attention is the so-called Design Thinking which has already been adopted by some of the world's top universities (Meinel & Leifer, 2011). Reports of using Design Thinking as a teaching method come from all levels of education. Nevertheless, there were hardly any attempts to link Design Thinking with entrepreneurship, although they both consider the development of new products and services as one of the central issues.

This article consists of four parts. The first part outlines the development of entrepreneurship education and its significance. The second part presents the development of problem-oriented teaching of entrepreneurship based on traditional methods of teaching business. The third part presents Design Thinking as a contemporary method of teaching entrepreneurship which has its roots in industry practice; it has been recently implemented in pedagogical practice and is increasingly becoming the subject of scientific discussions. The fourth section involves a presentation of the composition of the entrepreneurial course at the university level where students are introduced to the real world of entrepreneurship practice through the designerly way of thinking,

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teaching them important entrepreneurial skills and mindsets. The paper concludes with identified limitations and recommendations for further research.

TEACHING ENTREPRENEURSHIP

Teaching entrepreneurship at higher education institutions has over 60 years of history with the first entrepreneurial course presented at Harvard University in 1947 (Solomon & Fernald Jr, 1991). Especially since 1990, the number of world universities offering entrepreneurship studies increased significantly. Thus in 2003, entrepreneurship was taught at more than 1600 higher education institutions mostly in the U.S. (Katz, 2003). In the 21st century, entrepreneurship education became an integral part of the Slovenian higher education system where all the major business schools offered entrepreneurship courses or programs. Despite the fact that entrepreneurship was settled in the curricula of business and also some technical and natural science faculties, there is still much room for innovative approaches to delivering materials and experimenting with new teaching methods.

The prevailing view is that entrepreneurship education has a positive effect on the number and quality of entrepreneurs (Drucker, 1999; Fiet, 2001; Kuratko, 2004). However, there is no consensus on what entrepreneurial characteristics and skills can be developed through the educational process. Two of the properties in which entrepreneurship education has a positive impact are opportunity identification and the number and originality of generated ideas (DeTienne & Chandler, 2004). Also, some authors in recent studies suggested that the educational process can, in some cases, even have a negative effect on students' entrepreneurial intentions(Ebersberger & Pirhofer, 2011; Oosterbeek, van Praag, & Ijsselstein, 2010). Therefore, research on entrepreneurship education put intense focus on the efficiency and experimentation with innovative approaches that will better prepare students for the reality of the business world. According to Hytti and O'Gorman (2004), the objectives of entrepreneurship education can be divided into three groups: 1. understanding entrepreneurship; 2. be entrepreneurial; and 3. learn to be an entrepreneur. Learning the first objective is relatively simple and involves learning about entrepreneurship theory and attending guest lectures of successful entrepreneurs. The third objective is achieved by taking business courses and acquiring business skills, such as human resources management and marketing. The problem occurs with the second goal because there is no good answer as to how to develop entrepreneurial mindsets among students (Fayolle & Gailly, 2008), which will lead to viable and innovative solutions.

PROBLEM-BASED LEARNING

Problem-based learning is used at all levels of the educational system since solving problems cannot be learned through abstract exercises, but by putting students in real situations (Boud & Feletti, 1998; Delisle, 1997). It was developed in the field of medicine, but it was soon used in teaching technological and social sciences. Bound and Feletti (1998, p. 2) list the following as the characteristics of problem-based learning:

- use materials that back the discussion on the problem or issue;
- present the problem as a simulation of a real-life situation;
- proper steering of critical thinking of students and providing limited information that will assist in defining and solving the problem;
- students work as a team and have an advisor who knows the problem domain;
- students identify their needs for knowledge and use the available resources;
- knowledge that students gain becomes part of the learning process which is also critically evaluated.

In cases in which the focus of the educational system is directed towards delivering functional knowledge, skills and experience, problem-based learning is particularly effective. Problem-based learning was put at the centre of educational theory (Strmčnik, 1995) and is considered to be one

of the central ways of developing a learning culture (Strmčnik, 2009). In Slovenia, problem-based learning has developed at all levels of education (Drobnič Vidic, 2007; Potočnik, 1998; Stare & Klun, 2008). Although the problem-based learning has a definition and assigned characteristics, the process is still flexible enough to incorporate similar or complementary methods.

In addition to the knowledge and skills, entrepreneurship education should also help develop an entrepreneurial mindset, which includes (McGrath & MacMillan, 2000): passion and search for and development of new opportunities, discipline and perseverance in the work, strong focus, flexibility and integration of others in the entrepreneurial process. Nevertheless, we have yet to see any universally accepted goals or methods of entrepreneurship education (Fiet, 2001). The existing educational programs in the field of entrepreneurship are uniform (Katz, 2003) and the curricula usually cover the field of business studies. Nevertheless, there is still a gap between actual needs of entrepreneurs and the content of entrepreneurship education programs(Collins, Hannon, & Smith, 2004). Based on the problems and dilemmas of entrepreneurship education (Aronsson, 2004; Garavan & O'Cinneide, 1994; Harry Matlay, 2008; Meyer, 2011), the authors described a number of alternative pedagogical approaches which are mainly based on the assumption that actions founded on problem-solving methods have a greater impact on students' entrepreneurial intentions (Sherman, Sebora, & Digman, 2008). The alternative methods of teaching entrepreneurship were particularly well accepted at technical universities (Boore & Porter, 2011; Ulijn, Robertson, & O'Duill, 2004). Such institutions have a longer history of action and problem-oriented teaching methods which were often introduced into entrepreneurship from other disciplines. In entrepreneurship pedagogy, new methods are often regarded with skepticism because the existing methods are profoundly embedded and have a long history in the curricula of business schools. However, an increasing number of universities are developing alternative approaches (Pittaway & Cope, 2007), which includes, among others, business games, business start-ups as part of the curriculum, and using Design Thinking as a teaching methodology (Neck & Greene, 2011).

USING DESIGN THINKING IN ENTREPRENEURSHIP EDUCATION

Design Thinking, which was recently identified as one of the most promising alternative methodologies, has in recent years acquired pedagogical (Winograd, 2008) and research dynamism (Meinel & Leifer, 2011). It is based on methods that have been developed in practice and in this context, "Desing" is understood very broadly, as a process of development of products and services, business models, places, experiences and concepts. Some of the world's leading universities identified it as a promising method of teaching innovativeness, creativity, new product development and problem solving (Brown, 2008). Studies of designers who are able to operate in unpredictable environments and solve complex situations have shown that they have a way of thinking and acting, which can be termed as a "designerly way of thinking" or Design Thinking (Buxton & Buxton, 2007; Cross, 2001). Roger Martin, dean of the Rotman School of Management and one of the ideological fathers of the application of Design Thinking in business, defined it as the willingness and capability to build better solutions than already exist (Martin, 2004). He illustrated his idea with a choice of solutions A and B, none of which satisfactorily resolving the problem. With Design Thinking capabilities used in such a situation, one does not choose among the existing alternatives, but is willing and able to create a solution C which is better than A and B. The methodology basically consists of five phases of design and three circles of design. In addition to the methodology, a Design Thinker must internalize certain mindsets that enable the development of innovative solutions.

The five phases of design are a logical cognitive process flow of developing new solutions. Each step logically follows the previous one, but their use in practice is intertwined as the designer often returns to previous levels with the objective of improving the final solution. The steps are (Nussbaum, 2004): definition of the problem, observation, ideation, prototyping, and implementation. The three circles of design serve both as a reminder of the integrative thinking that

we must use to solve problems, and as an assessment tool to evaluate solutions. Any solution must roughly correspond to three conditions: technical feasibility, business viability and social desirability.

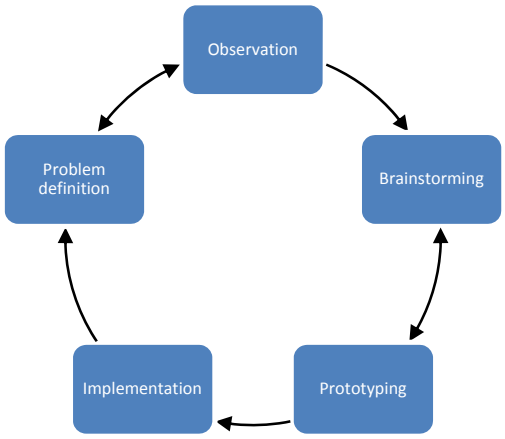

Figure 1 Process of Design Thinking

Source: Adapted from several sources (Brown, 2008; Nussbaum, 2004) (Nussbaum, 2004)

The problem definition includes the identification of users, constraints, the key success factors and common terminology (Simon, 1996).

Data collection or observation in a broader sense is one of the key stages which systematically investigates the user's expressed or unexpressed needs and desires (Lojacono & Zaccai, 2004). Initial observation is usually a collection of the existing data on the problem and its possible solutions. Designers identify all stakeholders who have any interest in the problem. Qualitative data collection, which includes primary fieldwork observation based on ethnographic research approaches, is often the preferred method of data collection. In comparison with quantitative methods of data collection, it gives a better insight into the cognitive processes and behavior of consumers in real situations. A designer uses empathy and tries to understand the users' feelings and thoughts (Brown, 2008). Only when looking at the problem from the users' perspective one can achieve in-depth understanding of the user's needs and desires. The designers use a series of ethnographic techniques, such as videography, netnography, interviews, focus groups, storytelling (Nussbaum, 2004), and psychological methods, such as eye tracking, voice analysis and facial analysis (Lojacono & Zaccai, 2004). The ultimate goal of observation is deep understanding of the problem which is a basis for generating ideas on how to solve it.

Since generating ideas is a creative cognitive process, we must ensure that the creation of ideas has no obstacles as it is often the case when the most unusual ideas are those which lead to the most important breakthroughs. Generating ideas is a teamwork activity that can be done relatively quickly, but has a great influence on the quality of the final solution (Lojacono & Zaccai, 2004). The rules, which in practice proved to be an essential part of the process of generating ideas, include (Nussbaum, 2004):

- avoiding dismissals;
- using and building on other ideas;
- promoting unusual ideas;
- promoting quantity rather than the quality of ideas;
- using visual aids;
- ensuring continuous focus;
- promoting courtesy in communication.

Usually, the group opts for the most promising solution (typically in several categories, such as the most daring solution, most preferred solution, least risky solution) and moves to the next phase, i.e. prototyping.

With the use of different prototyping techniques, designers learn from their mistakes and gradually improve the solution to such an extent that it establishes sufficient certainty that the it can be put to use. The prototyping process starts with quick and inexpensive methods and the designer performs many iterations to test the alternatives and improvements. Prototypes can be physical or virtual (Brown, 2008), depending on which aspect of our solution we want to test. The practice of prototyping involves (Nussbaum, 2004):

- prototyping of products, services, processes, places and experiences;
- using videography for understanding the use of our prototype;
- fast and frequent iterations to test as many aspects as possible;
- leaving details until the final stages of prototyping;
- using scenarios of using the solution;
- role-playing different users;
- testing solutions with different users;
- focused prototyping of different aspects of the final solution;
- selecting the final prototype for marketing.

In the final stage, the designer or the entrepreneur gathers the resources needed to introduce the solution to the market. Following the introduction, the designer or the team monitors the use of the solution and uses this information for improvements. Each solution has its own life cycle and the extension of it requires constant innovation and re-iteration of the Design Thinking process.

On the one hand, the three circles of design serve as a reminder of integrity which must be pursued in solving problems. On the other hand, they function as an assessment tool. Any solution must roughly correspond to the following three tests:

1. technical feasibility;
2. business viability;
3. social desirability

The first is technological feasibility which assumes that there exists a technology that allows the proposed solution to be built. In addition, one must take into consideration the principle of the best practical technology, which means that many technologies are too complex or too expensive to be suitable for practical use. To check the technical feasibility, designers often turn to natural and technical sciences.

The second condition is commercial success. The designer must provide the financial structure and prove that the project is commercially interesting. Certainly, the exception is social entrepreneurship where the pursuit of profit is not the primary purpose and one can often provide funding from sources other than sales revenue. To verify the viability, the designer turns to business and studies, including finance, marketing and strategic management. At the intersection of technology and business one learns how to manufacture or build the solution. This aspect is particularly important in the teaching of entrepreneurship as students learn how to integrate knowledge from other business and economic subjects in the process of founding a new company from the identification of the business idea to its implementation on the market.

The third and the most important condition is the desirability of a solution since design is in the service of man and society and their needs and desires (Brown, 2008). A solution would be technologically feasible and aggressive marketing can provide financial success, but if people do not actually need it, no problem has been solved. To check the desirability, it is necessary to turn to social sciences such as psychology and ethnography. With observational methods, we focus on the user, their physical, cognitive and emotional perception of the world, and develop solutions

based on their real problems. Designers put great emphasis of empathy and recognition of emotions, thoughts, desires and needs of target users (Brown, 2008).

Solutions that best meet all three criteria are interesting for further development. This interdisciplinary approach is crucial because only a diverse team consisting of people with different skills can propose holistic solutions. Such innovative solutions come from the center of the Figure 2 and are the final goal of the Design Thinking process.

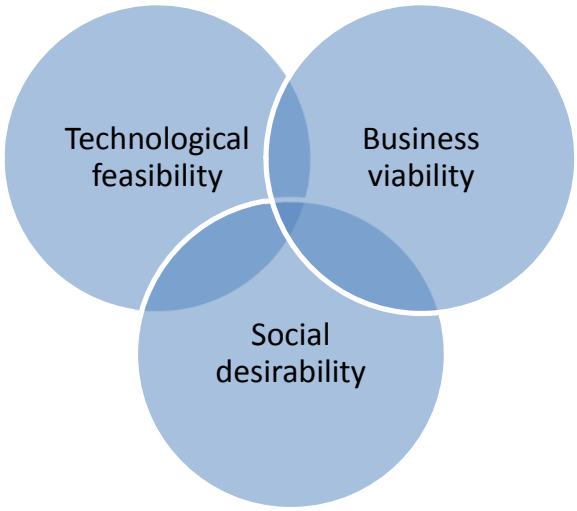

Figure 2 Circles of Design

THE CHARACTERISTICS OF DESIGN THINKING AND ACTING

Even though there were relatively few studies on the designerly way of thinking conducted thus far, we can already at this stage define some common features of Design Thinking and acting.

- Design Thinking has its own stages which do not always follow each other in sequence; as a basis, we use the synthetic-iterative approach (Rauth, Köppen, Jobst, & Meinel, 2010).
- In designer context, its abductive nature means that creating a desired future is at its core. For this desired future, we develop new solutions for the existing and new problems. A designer is always looking for new opportunities and solutions which do not yet exist, which means that Design Thinking is also opportunistic; it is led by the new social and economic value it creates.
- It is holistic and integrative as designers fully solve the problem (Martin, 2004) and understand it as a system with many connections and a number of inputs needed. With a broad understanding, curiosity and creativity they then propose solutions that present a significant improvement of the existing ones.
- An important part of the process is experimenting, both by seeking new ideas and applying observational techniques, especially in the prototyping stage where we iteratively improve the solution. Designers develop a solution which best suits the criteria of the three circles of design from a series of possible solutions with iterative prototyping processes (Kotchka, 2004). All Design Thinking techniques must be applied in practice, which means that the approach is strictly action-oriented (Rauth, et al., 2010).
- The approach is highly collaborative and transdisciplinary because it combines knowledge from different fields, adapts and uses them in relevant parts of the methodology. A team of designers is more effective when it includes individuals with interdisciplinary knowledge who can work in heterogeneous teams (Lojacono & Zaccai, 2004)
- It is focused on the customer whom it seeks to understand with empathic observational approaches. Designers imagine the world from the perspective of all those who are in any way concerned with a certain problem and with observing and looking for details that would be overlooked with conventional techniques of observation (Brown, 2008). Users are often unable

to articulate their desires and needs. To this end, the designer's task is to recognize them with empathic methods (Kotchka, 2004).

- The process is accompanied by optimism and creativity as designers look for solutions to the most complex problems and create new solutions instead of choosing between the existing ones (Brown, 2008).

Due to its nature and history of teaching in business schools, a fundamental change was needed so as to tackle inefficiency, to which scientific research and teaching experience drew attention to. For this reason, we started implementing Design Thinking as a new teaching method at the Faculty of Economics of the University of Ljubljana in an attempt to build on the existing entrepreneurial curriculum and give students the skills that were identified as useful both by theory (Rauth, et al., 2010) and practice (Kotchka, 2004). The next section describes the course contents and does not deal with the specifics of implementation owing to of the limited scope of the research.

INTRODUCING DESIGN THINKING TO ENTREPRENEURSHIP CURRICULA

When using Design Thinking as a teaching methodology, the curriculum is built around problem-based exercises, which (according to the methodology outlined above) fall into the relative sequence of actual entrepreneurial tasks. The students carry out these tasks and exercises sequentially and iteratively under the guidance of their teacher/mentor. The exercises are aimed at understanding the entrepreneurial process, developing skills and internalizing the entrepreneurial mindset.

Students are presented with a real-life problem that they must solve using the Design Thinking methodology. Depending on the project, each course contains a slightly different set of exercises and evaluation metrics which include using methodology (iterative, where applicable), the performance of individual exercises, the use of multimedia, expert assessment of iterations and the final solution, self-reflection by students.

Table 1 Structure of the exercises according to the stages of the Design Thinking process

Exercise	Description	Improved skills, mindsets
Problem definition		
Spatial distribution and grouping of information and knowledge	Using tables and post-it tags, students present, combine and eliminate redundant data.	Visual performance, interactive exchange of information in a team, focus.
Interacting with the extreme users.	Students find extreme users, such as early adopters, enthusiasts and intensive users.	Communication, empathy, holistic view.
"Why-How" exercise	With the question "Why?" we are trying to determine the deeper needs of the user, while the question "How?" reveals more practical aspects of understanding the user.	Sharing between abstract and concrete thinking.
Point of View	Transforming the initial problem statement which allows and encourages immediate action.	Action orientation.
Powers of ten	Students first look at the problem with the narrowest point of view and continue until they reach the broadest definition.	Encourages viewing the problem from different perspectives.
Observation		
Internet Research	Using online tools, browsers.	The use of technology, use of the existing data sources, discipline, perseverance.
In-depth interviews	Structured or unstructured interviews with key stakeholders.	Communication.
Field observations	Ethnographic observation with data collection.	Communication, empathy, objectivity, looking for opportunities.
Videography	Students obtain the permission and film the user's behavior and analyze the data.	The use of technology, field work.
Storytelling	Based on limited data, students relate a story of what happened.	Empathy, communication, imagination.

Analogies	Based on the analogy of similar cases, students model the behavior of the participants.	Empathy, flexibility, integration.
Customer profiling	Students draw a typical profile of a buyer.	Focus, the aggregation of data.
Data analysis	Analysis of qualitative and quantitative data.	Analytical skills, discipline, perseverance.
Idea generation		
Different approaches to generating ideas	Brainstorming, Method 635 and similar methods.	Innovation, new connections, promoting active thinking, generation of new ideas.
The question "How can ..."	Students pose a concrete question as a cue.	Cue for brainstorming.
Grouping and selection of ideas	Grouping together ideas, with a vote to choose the most promising one.	Focus, searching new opportunities.
Improvisational techniques and exercises	Wide variety of theatrical techniques in improvisation, games, behavior modeling etc.	Encouraging creativity, team integration, positive and relaxed atmosphere and encouraging physical experience which promotes the generation of new ideas.
Restricted generation of ideas	Generation of ideas with the introduction of restrictions. Examples: all solutions must be free, must stand for 1 million, etc.	Introduction of restrictions on generating ideas, leading to more unconventional ideas.
Prototyping		
Identification of key variables	Prototypes verify what is the real problem faced by users.	Clear identification of the variables that we wish to check with the user.
Using different methods of prototyping	Using simple drawing techniques, physical modeling, computer graphics and the like.	Flexibility, teamwork, integration.
Rapid prototyping	Time-limited prototyping using different methods.	Using the technology, flexibility, resourcefulness, cooperation.
Involving users in prototyping	Testing intermediate prototypes on their concrete users.	Observation, empathy, openness to innovation.
Implementation		
Test solutions	Final testing of functional prototypes with users.	Iteration, unpredictability, and observation.
The array of responses	Logging user responses for the next prototyping iteration.	Active listening and observation, systematic recording of customer feedback.
Storytelling	Training of users.	Clear communication of ideas.
Presentations	Practicing effective communication skills from writing to speech, marketing, sales and other communication with stakeholders.	Presenting ideas to potential investors.

The students are assessed at several levels and by multiple examiners and the assessment depends on the situation. Depending on the project, the process can be different from the previous processes; it may also contain slightly different steps, or at least different intensity of certain phases. Uniform evaluation is virtually impossible; therefore, the evaluation procedures are often developed in parallel with the project.

The assessment instrument includes more metrics, with its relative importance often determined at the end of the course. In the execution of tasks and exercises, it is necessary to assess the commitment and depth and adequately reward superior quality, which is only possible with a flexible assessment instrument.

CONCLUSION

Problem-based learning does not begin with the interpretation of the knowledge of discipline, but by presenting the problems that students will be solving through the course (Boud & Feletti, 1998). Design Thinking is basically a problem-based teaching methodology as the curriculum is designed to lead students through solving specific problems or tasks that are an essential part of the entrepreneurship practice. Through experiential exercises and tasks, students develop entrepreneurial skills and mindset which was missing in the existing entrepreneurship programs.

In this paper, we have descriptively and narratively presented the development, adaptation and application of a problem- and action-based teaching of entrepreneurship (Rasmussen & Sørheim, 2006), which has its foundation in business reality (Brown, 2008) and is on track to become one of the most prevalent methodologies in teaching creativity, problem solving and entrepreneurial thinking. Its practical application in different environments ranges from elementary school (Carroll et al., 2010) to the teaching of engineering sciences at the university level (Beckman & Barry, 2007). We are contributing to the growing body of scientific papers in the field of Design Thinking by adding a description of methods used to develop design thinking skills and mindsets tailored to entrepreneurship education. Our work can serve as a model for teachers of entrepreneurship or related disciplines at all educational levels; it is sufficiently flexible to be applied to a wide variety of environments, from pre-school to academic. We also call for a broader inclusion of problem- and action-based pedagogical methods to foster effective problem-solving and entrepreneurial mindsets. This will encourage innovativeness and creativity as two of the basic building blocks of a successful and development-oriented society.

Certainly, narrative and descriptive coding have certain shortcomings which particularly include the inability to generalize and bias by the reporter. In order to limit reporter bias, we tested the approach at several different faculties of the University of Ljubljana and participated in the same learning process at Stanford University in the U.S. which, despite different cultures, uses the same methodology and exercises. Generalization is supported by the methodology itself which is flexible enough to allow use in various situations, as demonstrated by the fact that Design Thinking as a pedagogical approach has been independently and simultaneously developed in practice at various levels and fields of study.

For further studies, we suggest the development of a measurement instrument which would allow the comparison of different approaches to teaching entrepreneurship. Qualitative case studies of courses using different methodologies and in-depth interviews with students and professors should also be conducted. Given the complexity of the pedagogical approach, there is also the question of the qualities a teacher or a group of teachers should have to effectively teach such classes. Mentoring such classes requires an extremely broad knowledge, ranging from ethnography to art and psychology. An argument supporting the universality of Designer Thinking as a teaching methodology should be more widely explored and further examples of use in different educational settings should be given.

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THE ROLE OF ROLE-PLAY: INTANGIBLE SYSTEMS REPRESENTATIONS FOR BUSINESS INNOVATIONS

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Role-playing is a means of concept representation that is often used in design thinking or service design, but relatively unknown in general management or business innovation. Originated in theatre, this technique can be used to prototype complex socio-technical systems, in order to evoke certain experiences in users, designers, or developers, as well as to gather feedback about a certain concept for iteration purposes. This paper presents a structured literature review about the use of role-plays in different fields, which results in a detailed framework of different types and characteristics of role-plays.

Keywords: Role-play, Bodystorming, Informance

INTRODUCTION

In information systems and business design, the main form for visualizing theories, systems, or concepts, is through modeling. There exist numerous modeling languages, such as BPMN, ERM or UML. These models can be used for communicating the current or desired status. Also, to a limited degree they can be used for testing purposes, in order to get feedback from users, and to improve the concepts. However, for specific systems (services or other complex socio-technical systems), a graphical representation doesn't produce enough feedback to validate design decisions.

In this article, we discuss a different means of concept modeling—role-playing—which comes in handy for prototyping and testing intangible or complex socio-technical systems and concepts, such as services. Although a role-play offers better user experiences and thus better user feedback than a formal description, this method is not yet well-established in the field of management. In fact, it may not even be considered a serious form of systems representation.

This article is structured as follows: We start by presenting a structured literature review about the use of role-plays in systems design. Then, we discuss role-plays as an alternative modeling method that can either serve as a research method, as a communication tool, as a creativity technique, as a prototype (e.g. for intangible concepts such as service designs), or as a training method, and distinguish between different types and forms of role-plays. Subsequently, we discuss role-playing in terms of its capability to represent and transfer design knowledge, with particular emphasis on the tacit character of role-plays. For that purpose we refer to a typology of design knowledge by (Müller & Thoring, 2010). And finally we analyze the different characteristics of role-plays, including advantages and disadvantages to summarize our findings in a framework. We also

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present a comparison with other methods for systems representation and testing, such as diagrammatic methods, regular prototypes, action research, and experiments. We conclude by pointing out the possible impact of role-playing in management research and practice, and suggest implementing role-playing into management curricula and scholarship.

LITERATURE REVIEW

This section covers a literature review about the use of role-plays in systems design. The found literature mainly stems from the Human-Computer Interaction (HCI) and product design field, not from management. Also we couldn't find a detailed explanation of the epistemological nature of role-play and its use as a research method. This paper tries to fill this research gap. See Table 1 for an overview.

For the design of a PDA, Binder (1999) use role-play of workers in their normal working context.

Buchenau and Suri (2000), from the design company IDEO, define experience prototypes as "any kind of representation, in any medium, that is designed to understand, explore or communicate what it might be like to engage with the product, space or system we are designing". They showed several examples of experience prototypes for 1) understanding existing user experiences, 2) exploring and evaluating as well as 3) communicating design ideas. Experience prototypes combine low-fidelity prototypes and role-playing.

Oulasvirta, Kurvinen et al. (2003) discover that in the normal design process of 1) research, 2) documentation, and 3) design, a lot of observations are lost or misunderstood. Therefore they suggest a technique called "bodystorming". This comprises brainstorming in a place where the phenomenon is directly observable and acting out user scenarios.

Dishman (2003) reports about a project at Intel Research that tries to design technologies that allow elderlies to live longer in their own homes. Additionally to observational (ethnographical) methods, qualitative interviews and surveys, they used so called "informances" or "informative performances". The five researchers played for two weeks different roles (personas) of elderly people with different characteristics and age-related impairments, and improvised a living space with e.g. foam-core walls and other technologies. During that time they brainstormed and prototyped different ideas and incorporated them in their staged living room. Ideas were shown to other people with an "informational performance". The five researchers said that by "doing" and "being" the target group, they learned more about them than with any other means. As the two main advantages of the "informances", they report a more holistic and empathic understanding of the social-technical system of an individual.

Johnson (2003) is calling the combination of performance ethnography and design improvisation "informance". It subsumes ethnography and empathy.

Simsarian (2003) suggests that role-play is useful in all different design phases, which are at IDEO understanding, observation, visualization, evaluation & refinement, and implementation. He calls the use of role-play for generating ideas "bodystorming" and for communicating ideas "informance".

Laurel (2003) coined the term "interactive drama". A drama is "interactive", if the participants can act within a representation and change things during the play. Therefore the interactions are potentially open and resemble characteristics of improvisation theatre (Johnstone, 1979).

Svanaes and Seland (2004) present the lesson learned from 6 HCI workshops based on low-fidelity prototypes and role-play. Their insight were that 1) participants don't need a special competence in acting, 2) low tech technologies (like foam models) are easier adjustable to the played scenario, 3) it is crucial that real users are participating, und 4) it is possible to combine role-playing and designing (designing-in-action technique).

Mehto, Kantola et al. (2006) present a case study of the application of drama and dramaturgy for user-centered product concept design. They used interactive theatre tools in addition to other user

research methods to get an empathic understanding about the user experience and the group dynamics in a specific situation.

Designers frequently use gestures to communicate dynamic aspects of a design (Fleming, 1998; Tang & Leifer, 1991). Based on these findings, Arvola and Artman (2006) use two techniques for spontaneous enactment of user interface interactions: interaction walkthroughs and improvised role play. They present a case study that showed the use of these two role-play types.

Another approach is LEGO Serious Play that uses LEGO bricks to make abstract contexts more tangible (Lego Serious Play, 2006). It was used e.g. for requirements elicitation of complex web applications (Cantoni, Botturi, Faré, & Bolchini, 2009; Cantoni, Marchiori, Faré, Botturi, & Bolchini, 2009).

Table 1. Structured Literature Review about the Use of Role-Plays

Source	Used Term	Participants	Place	Props	Research Field
Oulasvirta, Kurvinen et al. (2003)	Bodystorming	Designer	Field	Low-fidelity prototypes	Ubiquitous Computing
Buchenau and Suri (2000)	Experience Prototypes	User	Laboratory	Low-fidelity prototypes	Design
Svanaes and Seland (2004)	Role-Play	User and Designer	Laboratory	Various	HCI
Dishman (2003)	Informance	Researcher	Laboratory	Foam walls, Low and high-fidelity prototypes	Design
Mehto, Kantola et al. (2006)	Drama	Researcher	Laboratory	Various	HCI
(Cantoni, Botturi, et al., 2009; Cantoni, Marchiori, et al., 2009)	LEGO Serious Play	User and Designer	Laboratory	LEGO bricks	HCI
Simsarian (2003)	Role-Play, Bodystorming, Informance	Designer	Laboratory	Low-fidelity prototypes	Design
Laurel (2003)	Interactive Drama	Designer	Laboratory	Various	HCI
Arvola and Artman (2006)	Interaction walkthroughs, Improvised role play	Designer	Laboratory	Various	HCI

ROLE-PLAYS

The term ‘role-play’ usually refers to the acting-out of specific situations based on the adopting of another character or ‘role’. Several participants act-out a specific role in a usage and handling scenario, using props and dressing up. This can either be improvised, or scripted.

The origin of this technique can be found in the area of theatre play. Towards the end of the 19th century, the Russian theatre theorist Constantin Stanislavski focused on teaching actors to evoke acting skills by recalling own experiences (Stanislavsky, 1948). In the 1950s Keith Johnstone utilized improvisation in theatre acting and training (Johnstone, 1979). He coined the term ‘improvisational theatre’, which is determined by spontaneous reactions to unexpected input (e.g. given by the audience). Nowadays, the term ‘role-play’ also refers to certain computer-based role-playing games, such as “Final Fantasy”, or “World of Warcraft”. In an educational context, role-plays can be used to train or rehearse specific scenarios, such as job interviews or negotiations.

The focus of this article is to analyze and understand the role of role-plays and how they might be able to facilitate specific steps within the design and innovation processes of management projects. In management, role-plays can be used a) to evoke new ideas within the role-play participants, b) to gather feedback in a testing situation, c) to communicate a concept, d) to represent an intangible artifact, or e) to train specific behaviors. See the next section for a detailed description of these types of role-plays.

Role-plays usually involve the following elements: 1) roles, 2) participants or actors (can be users or designers), 3) props (objects, products, tools, specific dressing, etc.), 4) a setting (a specific environment/space, furniture, etc.), 5) rules (scripted dialogs, agreement on certain behaviors, or even the agreement not to use rules at all), and 6) interactions among participants, or between participants and objects (can be scripted or spontaneous).

In the following we distinguish between different types and forms of role-plays, and we present three examples of role-plays from an educational context.

TYPES OF ROLE-PLAYS

We distinguish between five types of role-plays, which are determined by the intended outcome or purpose:

1) Role-play as a creativity technique: This type of role-play is used to evoke ideas based on the experience people have while they perform a role-play. Putting oneself into a specific (although staged) situation will build-up empathy for the problem or the users, which may result in new ideas about possible solutions or optimizations. The actors become part of the system and can therefore understand it from an inside perspective. This is an explorative system analysis where new ideas are built inductively out of the experience.

2) Role-play as a research method: This type of role-play is used to test specific design solutions. This solution can be any product or software that is involved in the usage or handling scenario, which is communicated or tested in the role-play. Participants of the role-play (designers and/or users) can use these design solutions in a simulated scenario and analyse their feelings and insights while experiencing the role-play. This method generates qualitative data about the design solution to be used in further testing and iteration. The participants of this type of role-play are usually interested also in the design theories that lie behind the object itself. This is a confirmative system analysis where the hypotheses that incorporated in the role-play are deductively tested.

3) Role-play as a communication tool: This type of role-play is used to communicate specific design solutions to an audience. The role-play can incorporate tangible and intangible elements.

4) Role-play as an artefact: The role-play itself is the result of the design process—the design solution—, e.g. a service concept or a specific user experience. Interesting about this type of prototype is its intangible (tacit) character.

5) Role-play as a training method: For training purposes it is also helpful to use role-plays as a simulation environment, where participants can safely try-out an appropriate behaviour in a complex system. Examples are flight simulators or serious gaming.

FORMS OF ROLE-PLAYS

Independent from the type, which is determined by its purpose, a role-play can also have different forms (in terms of the used media):

1) Real-people role-play: Participants (designers or users) are acting-out a specific situation, similar to a theatre play. This usually involves a specific setting, the use of props, and sometimes dressing-up accordingly.

2) Role-plays through analogous media: Similar to a real-people role-play, a specific handling or usage scenario is acted-out—but not by real people, but by using figures made from clay, LEGO bricks, paper sketches or other forms of puppets. Acting-out such scenarios by using artificial figures can have the same impact as a real-people role-play: Participants adopt a specific role that they act-out, which may evoke the same or similar emotions as the real-people role-play. When using LEGO bricks and figures, this technique is also known as ‘LEGO serious play’ (Cantoni, Marchiori, et al., 2009).

3) Role-plays through digital media: The participants play in virtual worlds in order to simulate the impact of certain actions or decisions. Game technologies from the entertainment sector (like 3D

animation) are used for training and decision support. Another term used for these kinds of applications is “serious gaming” (Ives & Junglas, 2008; Schultze & Orlikowski, 2010).

EPISTEMOLOGICAL CLASSIFICATION OF ROLE-PLAYS

To better understand the characteristics and working mechanisms of role-plays, we refer to a typology of design knowledge (Müller & Thoring, 2010). This framework distinguishes between four types of design knowledge, located on four levels that are building up on each other: Level A = Design Artifacts (instantiations, 3D forms), Level B = Design Intuition (tacit knowledge) (Polanyi, 1983), Level C = Design Rational (explicit knowledge) (Nonaka, 1994; Nonaka & Von Krogh, 2009), and Level D = Design Theories (testable models) (Gregor & Jones, 2007). According to this typology, the three transitions between these four levels are of particular interest in terms of their capability to create new design knowledge (see Figure 1).

In the following, we compare the different elements of a role-play with these four levels and three transitions of design knowledge, in order to explain the working mechanisms of role-plays.

ROLE-PLAY:
The role-play itself is placed on Level B (tacit knowledge), since it is intangible. The script for that specific role-play may be available in explicit form (Level C), but the play itself is represented as an intangible experience of the participants.

ROLES:
The role description or definition is placed on Level C (explicit knowledge), while the emergent behavior (the acting-out of the role) is usually tacit (Level B).

PROPS:
Any object involved in the role-play is placed on Level A (Design Artifacts). The fewer the props—the more tacit the knowledge representation of the role-play is.

RULES/PLOT:
If there exists a common agreement, the plot is usually Level C knowledge (explicit). However, if the behavior is based on spontaneous, intuitive reactions of the participants, the rules are emergent (implicit knowledge, Level B).

EXPERIENCE:
The experience for the participants and audience is intangible (Level B). To put oneself in the shoes of the users is a tacit way to understand their problems and needs. Emergent emotions that come up within participants of a role-play are tacit (Level B), but they have to be externalized by communicating to other team members or users.

REFLECTION:
The evaluation of the experience is where new knowledge is being created. This happens in the transition between Level B and Level C (the tacit experience is externalized). Such a verbalization of certain feelings and emotions (externalization = transition B > C) requires a trustworthy environment (this is something that is not tangible but requires a specific company culture and atmosphere, which is also placed on Level B).

The understanding of the different types of knowledge representation and generation in role-plays is important to utilize role-plays in an effective manner. The intangible character of a role-play is what makes it such a unique experience. It is not possible to reproduce the evoked emotions and experiences in another way.

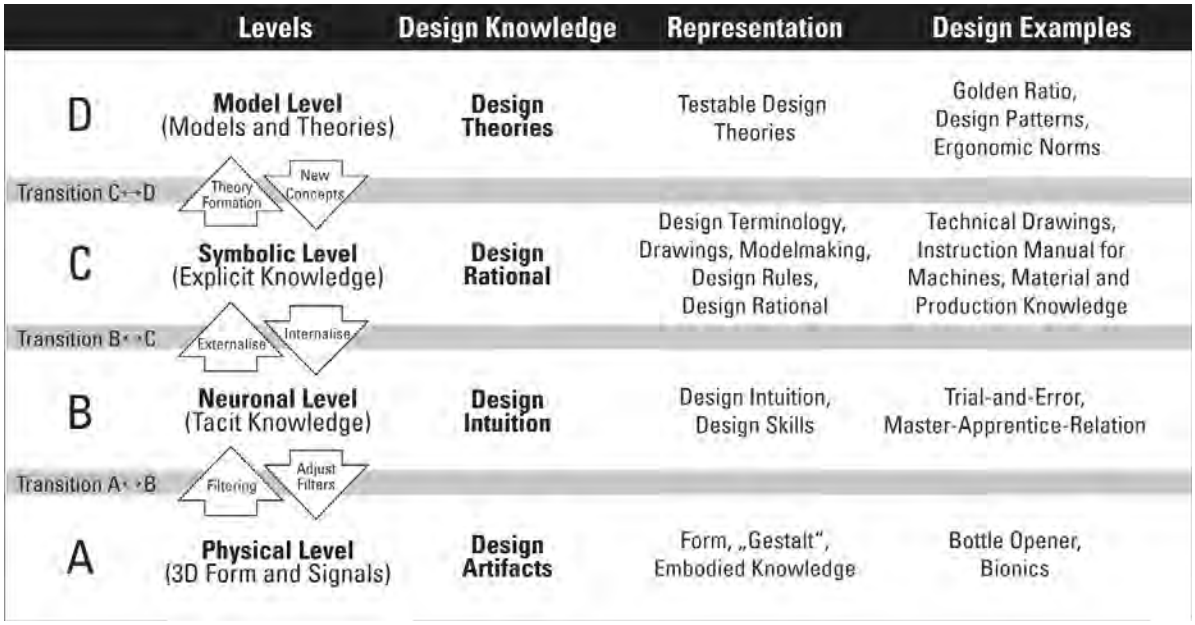

Figure 1 Framework of Design Knowledge (Müller & Thoring, 2010)

ANALYSIS OF ROLE-PLAYS

This section covers a detailed analysis of the five different types of role-plays (role-play as a research method, as a communication tool, as an artifact, as a creativity technique, and as a training method). The results are summarized in a framework (Table 2). Additionally, we analyze the advantages and disadvantages of role-plays in general, and we provide a comparison with other forms of systems representation.

CHARACTERISTICS OF THE FOUR TYPES OF ROLE-PLAYS

The following table shows an overview of the characteristics of the five identified types of role-plays. Interestingly, the role-play as a training method shows significantly different characteristics than the other four types: Here, the focus is more on the user behavior than on the designed system.

Table 2. Types of Role-Plays (Framework to Compare Characteristics)

	Role-Play as a Research Method	Role-play as a Communication Tool	Role-Play as an Artifact	Role-Play as a Creativity Technique	Role-Play as a Training Method
What is it?	Test	Informance	Intangible prototype	Bodystorming	Simulation
Focus	Evaluation	Communication	Representation	Generation	Representation
Change of	System	System	System	System	Behavior
Assumed as fixed	Behavior	Behavior	Behavior	Behavior	System
Purpose	Gather feedback, Test	Communicate concept to others	Experience of participants is intended outcome	Generate new ideas	Educate participants
Suggested forms	Real-people	Any	Real-people	Any, mainly real-people	Real-people, or through digital media
Knowledge	B > C (generate new knowledge by externalizing experience)	B > B (audience get empathic understanding) B > C (audience reflect)	B (experience for participants)	B (experience for participants), B > C (generate new knowledge by externalizing experience)	B (experience for participants), C > B (internalize rules and techniques)

	Role-Play as a Research Method	Role-play as a Communication Tool	Role-Play as an Artifact	Role-Play as a Creativity Technique	Role-Play as a Training Method
Specific advantages	Empathic understanding	Fast, fun, can be video taped	Representation of an intangible concept	No need to reproduce the experience (only needed once)	No need to reproduce the experience (only needed once)
Specific difficulties	Difficult to reproduce experience and to reflect on experiences	Performance can overshadow crucial details of the idea	Difficult to reproduce experience	Difficult to capture ideas while role-playing	Requires detailed preparation and deliberate practice

ADVANTAGES OF ROLE-PLAYS IN GENERAL

Compared to other forms of system representations, role-playing in general shows some major advantages:

1) It is fast. The role-play itself doesn't need a lot of time for preparation. Props can be improvised from any available objects. The participants get real-time feedback from the situation. The concepts can easily be changed, without a lot of effort.

2) It is cheap. There are not many materials needed. The main resource is the people who perform the role-play.

3) It is easy to implement. Everyone can do it, other than e.g. UML modeling, which requires some basic modeling skills.

4) It is fun. People usually like performing role-plays. It is entertaining and therefore it is more likely to find volunteers (e.g. test users) than for other forms of system representation.

5) It is easy to understand. Especially for inexperienced users, a role-play can provide a familiar and comprehensible situation. There's no need for long explanations or even to learn a specific modeling language.

6) It provides a safe environment. People do not need to be afraid of failing. The staged situation provides some kind of 'safety net' for the participants. There will be no annoyed or offended customers or the like.

7) It provides an empathic own-experience. A role-play is similar to a self-test. Instead of recalling a second-hand insight, participants experience the situation themselves.

DISADVANTAGES OF ROLE-PLAYS IN GENERAL

On the other hand, a role-play also has some disadvantages or challenges:

1) Ambiguity: Role-plays are highly individual. The experience for one person may not necessarily be the same for another one.

2) Reproducibility: A role-play is very difficult to reproduce. If you repeat it several times (with different people, or even with the same people), it will be very unlikely that you produce the exact same results or experiences again. Due to its intangible and tacit qualities, a role-play is not as easy to repeat or transfer to other contexts as explicit models or methods. What can be reproduced easily, however, are the tangible and explicit elements of role-plays, such as the script, the props, or even the setting, but this does not guarantee an identical outcome.

3) Archiving: Role-plays cannot be stored. You can e.g. videotape the role-plays in order to show it afterwards to another audience. However, watching a role-play will never evoke the same experience as performing it.

4) Company Culture: Role-playing requires an open and playful company culture that considers role-playing as a serious method. If such a culture is not established, role-playing can easily be ridiculed.

COMPARISON WITH OTHER METHODS FOR SYSTEM REPRESENTATION AND TESTING

In this section, we compare role-plays with some other (more common used) methods for systems representation, and compare advantages and challenges.

DIAGRAMMATIC MODELING LANGUAGES:

Diagrammatic modeling languages, such as BPMN, ERM or UML, represent a system in a graphical form (externalized knowledge, Level C), or even in the form of a design theory (Level D). Compared to a role-play, these modeling languages are precise and explicit. However, people have to learn and understand such languages before they can work with them and e.g. give feedback. Role-plays, however, can be understood by almost anybody, without prior knowledge or experience. Even though the syntactical correctness of a model can be checked automatically, for checking the semantic soundness of the model, a domain expert with additional knowledge of the modeling language is needed. For the question of user acceptance of a system, modeling languages do not help at all, because the mental jump from a formal language to the potential usefulness or ease of use of a system is nearly impossible, even for an expert. For a potential user this mental jump is too much to ask.

PROTOTYPES:

Prototypes in the classical sense—tangible products or digital applications—are difficult to compare with role-plays, since they have a different purpose. A role-play as a prototype (e.g. an intangible service concept) cannot be replaced by a physical prototype since the nature of the service is that it is intangible. A classical prototype stores problem-solution knowledge on Level A (within the artifact itself), which can also be extracted again (Müller & Thoring, 2011). But the tacit *experience* (Level B) cannot be recalled through a physical prototype. For that purpose, a role-play seems to be the only option. Of course you can also represent a service concept by other means, e.g. with a faked flyer or advertising for that specific service. Here, the knowledge is being represented in the form of a description (Level C). It is quite possible to gather some feedback about the service concept with such a prototype, but it will not be possible to evoke emotions and real experiences with it. Also, there can be physical prototypes *as part of* the service system—the physical touch-points for the users of the service (such as interfaces, access points, architecture, tools, etc.), but these can then be considered props. We believe these props would be of higher impact if they were involved in a role-play, which explains also the usage and handling scenario, and evokes the experience of how they should be used, instead of being presented as-is.

ACTION RESEARCH:

Action Research has some similarities with role-plays as a research method. A specific solution (e.g. a prototyped product) is brought into a specific usage scenario, in order to test it or to gather feedback and insights (Baskerville, 1999; Lewin, 1946). Action Design Research combines Action Research and Design Science by interlinking the building of the artifact, the change of the organization, and the evaluation of the artifact (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011). However, in Action Research and Action Design Research such a solution is taken to a real context, while a role-play takes it to a faked or staged environment, which has two major advantages: First, the role-play provides a safe environment (if the solution fails, this is not doing any harm). Second, the staged environment can be one that does not exist so far. So, Action Research is only possible within already existing contexts, while in a role-play the context can be not yet existing or difficult to access.

EXPERIMENT:

A scientific experiment also has some similarities with role-plays as a research method. As the role-play, an experiment can be used to gather feedback from the participants, e.g. in a usability test setting. However, the experiment is usually a quantitative research approach. Results are measured in a quantitative manner, e.g. by comparing a test group with a control group (Shadish, Cook, & Campbell, 2002). Role-plays, on the other hand, are usually performed in a qualitative way. Here, the researcher is interested in individual experiences or actions. Role-plays focus on knowledge representation on Level B (tacit knowledge), while the experiments produce explicit (measurable) knowledge on Level C. The experiment wants an objective analysis of the behavior and therefore treats the behavior as a black box. Role-play, on the other hand, is interested in the subjective experience in that situation. Through the self-testing it tries to look inside the black box of the experience.

CONCLUSION

While role-playing as a training method is quite established in management practice and research (e.g. in serious gaming or other computer-supported role-plays), the other four forms of role-plays—role-play as a creativity technique, as a research method, as a communication tool, or as an artifact—are rarely used. However, theses types of systems representation offer some major advantages compared to usual methods, as illustrated earlier. Restricting the vocabulary of systems representation to structured and explicit representations (such as diagrammatic modeling), will limit the variety of outcomes. The establishment of more tacit forms of systems representation (such as role-playing) may add to the qualitative deep understanding of a system from the user perspective. Our suggested framework of role-plays (Table 2) illustrates different types and forms of role-plays, their respective characteristics, their epistemological status, and possible applications. Along with our analysis of role-plays with their respective advantages and drawbacks we believe this validates the eligibility of role-plays as a supplementary methodology for management research, testing, training, prototyping, and idea generation. Therefore, we suggest considering role-plays as an additional or alternative system representation technique.

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THE MINDSET BEYOND THE MYTH – EVALUATING THE FUTURE PRACTICE, APPLICABILITY AND TEACHABILITY OF DESIGN THINKING THROUGH WORKSHOP CHALLENGES

Diana SCHNEIDER and Kilian MOSER

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This paper aims to unravel the Design Thinking myth by analysing how a hands-on workshop format with urban challenges impacts the *participants* - design novices with no previous experience applying Design Thinking.
Although the hype purposefully built around Design Thinking (Walters, 2011) has been beneficial in bringing about the shift from design as a tactical towards a strategic catalyst of innovation (Wasserman, 2011), Design Thinking needs repositioning (Merholz, 2009), battling the illusion of a simple creative toolbox (Nussbaum, 2011). Through the analysis of a 2-week Design Thinking workshop with 15 cross-disciplinary participants, the authors reveal the three-layered impact of an action-based teaching format to generate understanding (1), ownership (2) and incubation (3) of the Design Thinking ethos.
In conclusion, this paper postulates a concrete role, practice, applicability and teachability of the next generation of Design Thinking, based on action, indirect knowledge diffusion and context-dependency.

Keywords: Design Thinking, Workshop, Knowledge diffusion

INTRODUCTION

In recent years the buzz of Design Thinking, advocated by the Stanford d.school, IDEO's Tim Brown, Bruce Nussbaum and a range of innovation forerunners has reached the business world and far beyond. Design Thinking was branded a method challenging conventional problem solving processes by leveraging the designer's approach to combine people's needs, technological feasibility, strategic business viability and market opportunity to the full spectrum of innovation activities (Brown, 2008), be it product, process, service, brand (Roscam-Abbing, 2011).

Yet the notion of Design Thinking, however pivotal towards holistic innovation it may be, is also a field of controversies, conflicting definitions and misconceived notions of creative tools for superficial cure-all solutions to deeply rooted structural challenges.

As an interdisciplinary team evaluating the future implementation of the design approach in a strategic innovation context, it is our goal to counteract the buzzword-laden, purposefully vague myths shrouding Design Thinking's concrete potential and postulate its clear, concrete and implementable positioning.

VANTAGE POINT - EVALUATING DESIGN THINKING FROM THE DESIGN NOVICE'S PERSPECTIVE

The definition, scope and alleged effect of Design Thinking in a variety of fields is a vastly discussed leitmotif in the design world, specific literature, media and business courses, to name the tip of the iceberg. What the current scientific and mediatized examination of Design Thinking seems to underestimate, however, is how *non-designers* perceive, assimilate and apply Design Thinking.

This paper aims to examine Design Thinking not from the design thinkers' stance, but from the *design novices'* point of view. Thus, by researching how Design Thinking is currently understood (I) and adopted by design novices through a workshop format (II), we aim to reposition the future of teaching Design Thinking (III).

RESEARCH SCOPE – DESIGN THINKING WORKSHOP AND FOLLOW-UP ANALYSIS

This paper evaluates the findings of a Design Thinking workshop researched, planned and co-hosted by a design entrepreneur, an industrial designer and a business administration PhD-student in Munich, Germany, in early spring 2012 at the Center for Digital Technology and Management (CDTM), Munich.

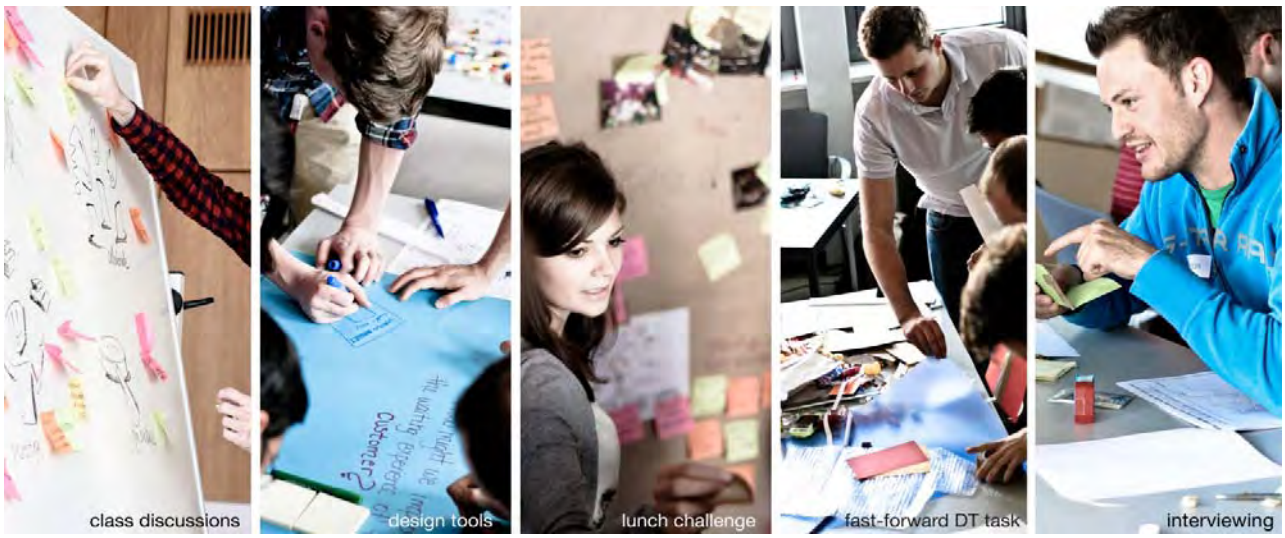

Figure 1 - Impressions of Design Thinking workshop at CDTM, Munich. Image credit: Moser, 2012.

The empirical data substantiating the evaluated hypotheses consists of the workshop outcome, a paper-based internal feedback interview of all workshop participants and an online survey of 33 additional members of the CDTM-community who had not participated oin the workshop, to gauge the effect of the Design Thinking workshop on non-participants in a semi-closed environment.

WORKSHOP FRAMEWORK - PARTICIPANT COMPOSITION AND CONTENT STRUCTURE

Given the interdisciplinary teaching approach of the CDTM, a set of different academic disciplines and professional backgrounds attended the Design Thinking workshop outlined in this paper. Limited to a group size of 15, the Design Thinking workshop grouped participants between the ages of 22 and 27 years, composed of four female students, eleven male students and a variety of study backgrounds illustrated in Table 1.

This interdisciplinary composition of the workshop group is a key factor in mutual learning and understanding of the different disciplines with Design Thinking acting as an enabler (Best, 2012) and catalyst in this process.

Table 1 - Interdisciplinary study background of the workshop participants

Study background	# of participants
Business Administration	4
Communications Engineering	1
Computer Science	5
Electrical Engineering	1
Mathematics	1
Mechanical Engineering	1
Media Informatics	1
Political Science	1

Given that all participants are part of the Technology Management study program at the CDTM, a joint project experience pre-existed in a majority of the cases.

I. CURRENT POSITIONING OF DESIGN THINKING LEAVES ROOM FOR IMPROVEMENT

By analysing the perception, understanding and experience *prior* to the workshop, this paper aims at clarifying how Design Thinking is currently interpreted by non-designers from a variety of study backgrounds. We structured this section as follows:

First we will introduce the composition of the workshop group (15 participants) and the control group (33 additional survey respondents) with regards to their previous awareness of Design Thinking. We will then evaluate the results of the interviews and quantitative survey of respectively workshop participants and non-participants before elaborate on the findings.

WORKSHOP ECOSYSTEM - PARTICIPANTS AND NON-PARTICIPANTS

The Design Thinking Workshop presented in this paper has first been tested at the CDTM, a joint institute of the Technische Universität München (TUM) and the Ludwig-Maximilians-Universität (LMU). For the further analysis within this paper, the CDTM will be considered a semi-closed ecosystem, based on its *physical (a)* and *informational (b)* close-knit structure. The former is caused by the fact that the CDTM occupies a separate floor in a separate building where all CDTM learning activities occur independently of the other educational centres in Munich, the latter determined by the intense flow of information among its members through word-of-mouth, newsletters, lectures, evening events and group projects. This setting allows a controlled analysis of the impact of the Design Thinking Workshop on the immediately surrounding ecosphere.

SURVEY RESULTS – INITIALLY EXISTING YET UNCLEAR AWARENESS ABOUT DESIGN THINKING

The awareness about Design Thinking can be analysed on two levels: *understanding*, evaluated through the respondents' *definition* of the mindset (a) and *opinion*, evaluated through the *role* respondents accord to Design Thinking (b).

Considering an active student body of around 70 students spread over four classes, the 15 students who participated in the Design Thinking workshop and the 33 non-participant interviewees represent roughly 69% of the entire active student body at the CDTM.
The initial awareness of Design Thinking in the analysed ecosystem prior to the workshop experience is gauged through the responses of the control group (33 non-participants) and the answers to all questions relating to "before the workshop" (15 workshop-participants).

VAGUE UNDERSTANDING OF DESIGN THINKING PRIOR TO WORKSHOP PARTICIPATION

Workshop participants can be split into two groups: participants with prior knowledge on Design Thinking and participants with no or almost no knowledge on Design Thinking.
Interestingly, a little less than half of the workshop participants (45%) had prior contact with "Design Thinking". Participants had acquired this prior knowledge from a variety of sources,

ranging from information from general media (2), specific literature (2) and business cases (1) to friends (2) and courses at university (3). However all of those 45% had never actively applied Design Thinking methods in a project. Although they had been in touch with the topic prior to the workshop, definitions of Design Thinking exhibited extreme differences in the understanding of the actual nature of Design Thinking, illustrated in table 2:

Participant	Definition
#1	*"A process for finding solutions of complex problems with the help of a multidisciplinary team."*
#2	*"Brainstorming in a team, writing on a scratchpad and discussing."*
#3	*"A discipline which aims to solve peoples need, using creative techniques."*
#4	*"define, research, ideate, prototype, choose, implement, learn"*
#5	*"A comprehensive and multidisciplinary methodology to create applicable and innovative products and services for businesses"*

Table 2 - Definitions of Design Thinking prior to the workshop participation – excerpt of statements

Table 2 illustrates a set of definitions given by workshop participants prior to the workshop, ranging from "brainstorming in a team" (#2, fuzzy and only partially correct understanding) to the correct naming of the d.school, Stanford Hasso Plattner Institute of Design, seven-step process (#4, concise recapitulation of the specific process). This corroborates the unclear current positioning of Design Thinking from the recipients' - design novices - point of view.

AMBIGUOUS ROLE ATTRIBUTED TO DESIGN THINKING PRIOR TO WORKSHOP PARTICIPATION

Another interview question inquired after the perceived *role* of Design Thinking, given by workshop participants with previous exposure to the mindset. The results shown in table 3 indicate that the perceived roles largely differed.

Participant	Perceived role of Design Thinking
#1	*"I thought it was mainly used in design consultancies."*
#2	*"Enriching product/project with creativity - Early prototyping*
#3	*"Design Thinking is suitable to find innovative solutions for wicked problems while an engineering design approach might rather produce predictable outcome."*
#4	*"another ideation and evaluation tool"*
#5	*"It provides a toolbox with different mind-settings as well as methodologies to actually identify people's need and problems and to build upon these things innovative applications, products and services"*

Table 3 - Perceived role of Design Thinking (prior to workshop participation) – excerpt of statements

On one end of the spectrum, it's role is seen as a "another ideation and evaluation tool" (#4) or "mainly used in design consultancies" (#1), confirming the strong marketing of design agencies such as IDEO to appropriate a mindset that has been existing decennia before (Wasserman, 2011) Tim Brown started his Design Thinking branding campaign in the 2000's (Brown, 2008). On the other end of the spectrum, several respondents proved to have a nuanced understanding of the nature and positioning of the Design Thinking ethos (#3, #5). These qualitative results indicate not only the importance of a common understanding on the role and benefits of Design Thinking, but also the need to communicate these clearly, since previous exposure to the teachings or practice of Design Thinking didn't prevent misunderstandings on the nature and scope of the topic.

OPPORTUNITY – CLARIFYING AND CONCRETIZING DESIGN THINKING

Firstly, the analysed data corroborates our initial hypothesis that there is awareness about Design Thinking in the non-design world with roughly half of respondents having been exposed to Design Thinking in the past. Yet the understanding of the *current* generation of Design Thinking remains disparate and imprecise. This leaves room for a clear-cut, well-defined positioning of the *next*

generation of Design Thinking, communicating its concrete benefits as opposed to vague allusions and simplifications of a faceted way-of-thinking into a handy set of tools.

The demonstrated need for an unequivocal positioning of the next generation of Design Thinking coincides with the emergence of limits to the first generation. After reaching boardrooms, business schools and cross-disciplinary debate alike, the initial wave of Design Thinking starts showing cracks, not least when Design Thinking godfather Bruce Nussbaum questions its future (Nussbaum, 2011). Hence, it appears vital to envision and concretize the *next* phase and examine the ways in which the design approach can successfully and convincingly catalyse and inform innovation currently and in the future. This upcoming generation of Design Thinking needs to be accompanied with a clear, concrete and understandable positioning to avoid the myths and misconceived notions the current understanding is limited by.

II. WORKSHOP ENABLES DESIGN THINKING ADOPTION ON THREE LEVELS

The Design Thinking workshop at the basis for this scientific paper covered theoretical and practical sessions, cases, group discussions, compact design exercises and a two-week Design Thinking challenge to be solved in teams.
In order to judge the effect of our chosen workshop framework to communicate the Design Thinking ethos, we will first outline the outcome of the workshop, before introducing a three-staged information diffusion model.to analyze the workshop impact at an institutional level.

WORKSHOP OUTCOME – HANDS-ON SOLUTIONS TO URBAN CHALLENGES

The participants were given a task and a physical location in Munich to initiate their exploration phase in which they applied the methodology, tools and skills acquired in introductory theoretical, practical and group feedback workshop sessions. Then, the interdisciplinary teams, coached in intermediary feedback rounds by the lecturers, experienced the real-world run-through of Design Thinking through the empathic exploration
(1), problem framing (2) and concept ideation and testing (3) phases of the Design Thinking process developed by the authors. Finally, the presented results were presented and evaluated. The following table 4 shows the team tasks and self-description of the developed solution:

Two-Week Design Thinking Challenge	**Developed Solution as described by the Teams**	**Image**
Team PLAYGROUND: How might we make the handing over of little children in the pre-work morning rush at the kindergarten more pleasant for everybody involved?	*"What do 3-year old kids do to make new friends on the playground? Up until the end of April 2012, there was no solution enabling kids to actively seek and keep contact with other kids they just met on the playground. In order to make exchange of contact data possible and attractive to both parents and kids, the team took the concept of a business card, tailored it to the involved parties and thus the "Friendship Card" was born.* *The cards can be found at the life-sized card holders, situated at playgrounds. On the front side of the 20x30cm card parents can write their contact data and indicate on which weekdays their kid has time to go to the playground. The backside is dedicated to the kid's drawing, making the whole exchange of contact data more individual, emotionally appealing, and way more fun!"* *(text credits: Petkov Petromil, Pickert Simon, Ziehn Niels)*	 *Figure 2 - Team Playground with their Friendship Cards, Image source: Moser, 2012*
Team CONSTRUCTION SITE: How might we make the lunch break of construction workers on urban outdoor construction sites a healthy, social, safe, invigorating lunch experience?	*"Did you ever think of improving the lunch break of a construction worker? That was our task in the 'Design Thinking' workshop. Armed with Design Thinking methods, a camera and a questionnaire we took a tour to the construction landscape of Munich. Back at CDTM and several brainstorming and framing sessions later, we came up with the idea to meet the need of relaxation highly ranked in our list consisting of warm food, relaxation, and socializing. We came up with the idea to bring relaxing and work clothes together, to transform a normal construction site helmet into the relaxation island for workers. Therefore we added features such as earmuffs which provides music, special goggles and a head massage device."* *(text credits: Neuerburg Leopold, Schewtschenko Sabrina, Seebauer Daniel)*	 *Figure 3 - Sketch of the construction helmet Image source: Neuerburg, Schewtschenko, Seebauer, 2012*
Team PARKING GARAGE: How might we improve the late night parking house experience?	*"Walking and driving through four parking lots in Munich late at night, we tried to soak in the experience. After three nights of exploration the picture became clearer: Parking lots are made for cars, not for people! During night, as less people come by, the atmosphere gets creepier—especially for women.* *In order to make underground parking lots safer at night, we developed the reactive parking lot concept: The ceiling is tiled-up with interactive squares that light up whenever there is someone beneath them. This allows every person to intuitively feel and see the presence and direction of movement of other people on the floor, even those hidden behind a car. The pillars are built out of semi-transparent concrete in order to overcome their view-limiting nature. A stop-motion prototype can be accessed at: http://vimeo.com/41276951"* *(text credits: Schneider Hanna, Schubert Ludwig, Taifour Sinan)*	 *Figure 4 - Stop-motion of the design solution Image source: Schneider, Schubert, Taifour, 2012*
Team LIBRARY: How might we make the short breaks of students studying in the library more social, enjoyable,recreative?	*"State library, Munich, 4pm - a lot of people need a short 10-20min break. Yet what do they need and how to solve it? Interviews were amongst a couple of different observation and immersion methods (collecting trash, shadowing people, letting people draw) within the empathic exploration phase for our Design Thinking challenge. In most observations and interviews one problem dimension seemed to pop up: Space. The State library seems to lack space for enjoyable breaks, for consuming food, for relaxing in a quiet atmosphere or to exchange with your friends. Our solution is about making the best use of existing spaces. Flexibly and removable. Putting pillows on the stairs and window sills - with curtains offering little private rooms. Inventing a modular seating system that features: A high back of chairs, noise cancelling and through bending adjustable. Due to its half-round shape chairs are placeable in (half-)circles, creating private spaces for groups, not disturbing others.* *(text credits: Bösch Lisa, Gautam Saksham, Hörner Michael)*	 *Figure 5 - Photo-Mockup of State Library group spaces Image source: Bösch, Gautam, Hörner, 2012*
Team PUBLIC SERVICE DESK : How might we make the waiting experience of customers at public service desks more convenient and entertaining?	*"We went to the KVR (German public service desk) looking for ways to improve people's waiting time. We observed people's actions while waiting and even went to whole process of issuing a new ID. We realized that once you arrive there, you just feel as the number you got waiting to be called. Our idea consisted of setting counters in the entry that measures the time you have to wait depending on the document to issue. Then, you choose between the community line and the fast line. People who select the community line have free access to the KVR waiting facilities though wait longer than people on the fast line. After selecting the desired line, you are welcomed to a waiting space that suits to different target groups. In this waiting space, you find first a relaxing coffee shop where citizens can interact. Close to it, there is a playground for the children that accompany parents or grandparents. Finally, there is working area for people who need access to Internet and technological devices in order to spend their time productively."* *(text credits: Cortez Valeria, Fink Martin, Verse Björn)*	 *Figure 6 – Groundplan of the dual-lined service solution* *Image source: Moser, 2012*

Table 4 - Recapitulation of Design Thinking workshop outcome

All teams demonstrated nuanced understanding of the Design Thinking mindset, methods and tools, identified valid and diverse insights, formulated relevant framed design tasks and solved them with a design-minded approach, as indicated in table 5.

Team Name	Team Composition	Lecturers' Evaluation on Design-mindedness of outcome
Team PLAYGROUND	*2 male Computer Science majors* *1 male Management & Technology major*	+ leaving male comfort zone to visit playground locations and talk to mothers of small children + gathered valid, diverse feedback from real users in their real context and formulated relevant insights + different stages of low-, mid- , high-resolution paper mock-ups
Team CONSTRUCTION SITE	*1 female Computer Science major,* *1 male Electrical Engineering major,* *1 male Business Administration major*	+ leaving comfort zone to explore construction sites + use of diverse, relevant tools without doing tools just for the sake of it: sensitive understanding of what they can be used for + switch from the physical room (container) to the personal space (zone surrounding a person) + good "low-tech" prototyping with solid background research + returned to the construction sites to gather feedback
Team PARKING GARAGE	*1 female Media Informatics major,* *1 male Computer Science major,* *1 male Communications Engineering major*	+ good idea as response to the problem of the "female fear of being raped", but not limited to it : fresh, surprising and very sensitive solution of a highly stigmatized and misunderstood problem + sensitive and multi-sensorial way to experience the entire situation / setting with focus on *context*, rather than product + the courage to completely overthrow an almost finished concept
Team LIBRARY	*1 female Management & Technology major,* *1 male Mechanical Engineering major,* *1 male Computer Science major*	+ intense exploration phase to understand the user perspective + diverse ideas were teste on location + use of 2D and 3D prototypes of different resolutionsl + development of a solution that's integrated into the *context*
Team PUBLIC SERVICE DESK	*1 female Business Informatics major,* *1 male Management & Technology major,* *1 male Political Science major*	+ Exploration using variety of tools to map all stakeholders + Identification of different user needs demonstrated through role plays + relevant, innovative solution that has realistic potential

Table 5 - Team composition and Evaluation of Generated Outcome – Excerpt of Lecturer Feedback

This adoption of the Design Thinking ethos was all the more note-worthy when considering that more than half of participants hadn't been exposed to Design Thinking before and that the given challenges required them to leave their natural comfort zone and venture into the urban context which defined the setting of their two-week task.

DIFFUSION MODEL – EVALUATING THE LEARNING IMPACT OF THE WORKSHOP

To evaluate how the Design Thinking workshop could lead design novices -participants and non-participants alike- to real insights into the design ethos, we propose a three-layered knowledge diffusion model, depicting the information flow (figure 7)

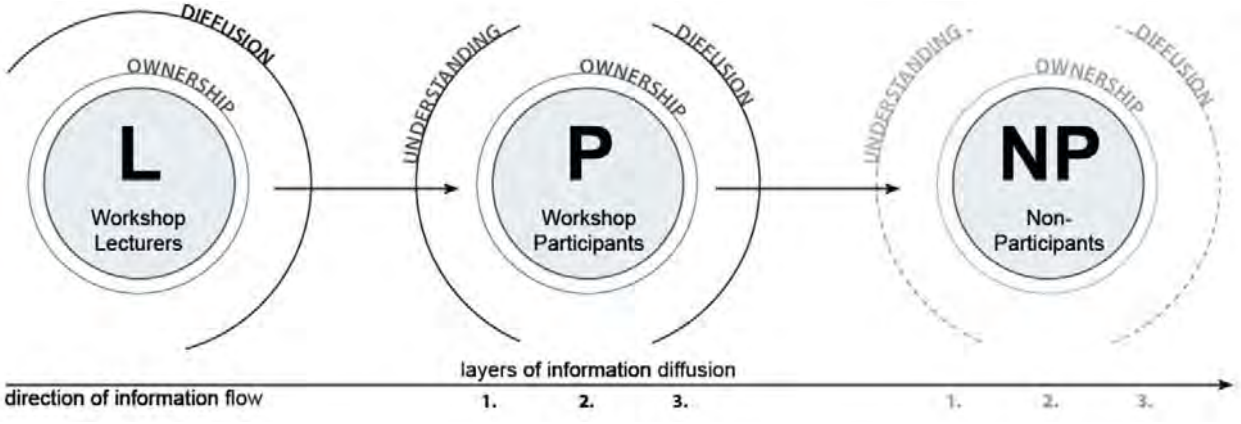

Figure 7 - Proposed three-layered knowledge diffusion model indicating groups and levels of impact

The main components of the proposed model are the involved impact groups and layers of knowledge diffusion.

IMPACT GROUPS AND DIFFUSION LAYERS

In the researched setting, students at the CDTM can be clustered into impact groups: Every impact group is expected to enact a different set of actions. Hence, for every impact group we measure the actions sorted by the level of involvement with the Design Thinking Methodology. In essence, we consider the active application of Design Thinking Methods a stronger indicator of success than a mere chat about DTM with peer students.

Workshop Lecturers (L) initiated the direct information flow to the participants of the workshop, introducing them the methods, mindset and example cases of Design Thinking that would help them understand, apply and share the ethos behind the myth.

Workshop participants (P) were directly exposed to the Design Thinking workshop. Hence they are expected to become thought leaders and drivers of information flow. Every term students are enrolled in a number of different projects that potentially would be suitable for certain Design Thinking methods. Hence it is of key interest to find out to what extent workshop participants (P) contributed to the information flow within the CDTM ecosphere.

Non-participants (NP) are active students that did not take part in the Design Thinking Workshop. Nevertheless, they are of equal interest to measure the success and impact of the Design Thinking workshop in a business context since their actions (if triggered by information or action of Ps) is an indicator for indirect success of the workshop. NPs with direct contact to P are expected to have more direct exposure, hence should exhibit more involvement with the Design Thinking Methodology compared to other NPs.

The four layers of information diffusion identified throughout the analysis of the Design Thinking workshop are understanding (1), ownership (2) and incubation (3):

- The *primary* aim of this workshop was to broaden the skill-set of all participants to explore human-centered design and action-based innovation methods and apply them to tangible and intangible challenges. This is called the "*understanding*" layer.

- The *second* goal was to evaluate how, to which degree and in which circumstances the mindset behind the hype would be valued by the participants and used in their personal work, beyond the two-week workshop. This is termed the "*ownership*" layer.

- The *third* objective of the workshop was to gauge the effect of information sharing and the potential for communication of workshop experiences and insights by individual participants to their non-participant surrounding. This layer is named "*incubation*".

WORKSHOP IMPACT AT LEVEL 1 - UNDERSTANDING

In order to gauge the impact of the workshop outlined in this paper on participants' *understanding* (first layer), interviewees were asked to evaluate the improvement of their understanding of Design Thinking before and after the workshop.

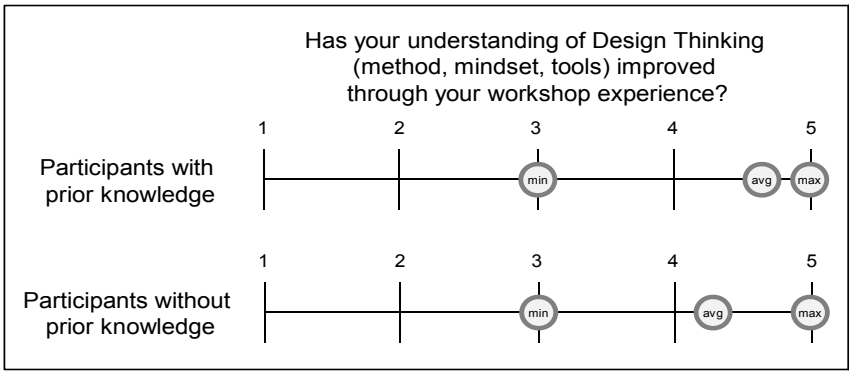

Figure 8 - Quantitative interview results on the change of the understanding of Design Thinking in terms of method, mindset and tools. Quantitative scaling ranging from 1: absolutely no improvement to 5: significant improvement. The plot illustrates minimum, maximum and average values. Source: own illustration

The positive impact illustrated in Figure 3 can be further backed up by asking workshop participants to define Design Thinking once more after they had attended the workshop:

Participant	Definition
#1	*"The process of reaching creative solutions for almost any type of problem, even the everyday ones."*
#2	*"Understanding the problem by using empathy, exploring the environment to get leads to solution ideas, prototyping and lots of discussion."*
#6	*"Set of tools applicable in a certain process helping you to find and solve problems of human beings pragmatically yet beautifully."*
#7	*"Catering to customers' needs."*

Table 6 - Definitions of Design Thinking after workshop participation – excerpt of statements

Table 5 depicts four definitions. Participant #1 and #2 had prior knowledge about Design Thinking. Participants #6 and #7 had not heard about Design Thinking before attending the workshop. All definitions show a nuanced understanding of the Design Thinking ethos.

WORKSHOP IMPACT AT LEVEL 2 - OWNERSHIP

To evaluate whether the workshop had an effect at the *ownership*-level, i.e the ways in which the mindset is valued and used in the participants' personal work, the respondents were asked whether their opinion about the content, purpose and benefit of Design Thinking had changed for the better before/ after the workshop. The impact thus demonstrated is shown in figure 4:

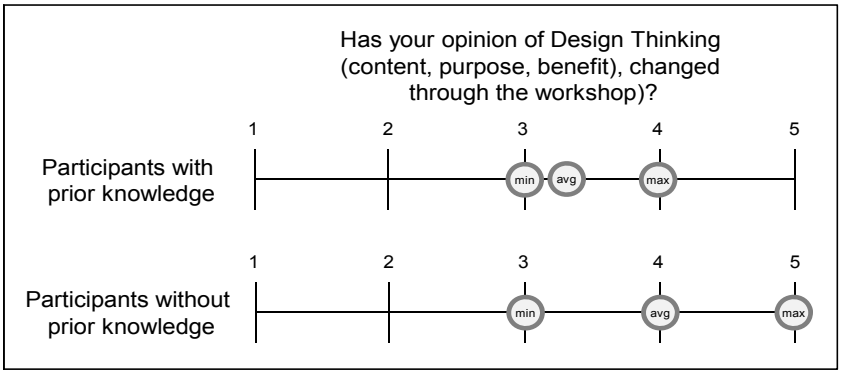

Figure 9 - Quantitative interview results on the change of opinion of Design Thinking in terms of content, purpose and benefit. Quantitative scaling ranging from 1: absolutely no improvement/ change to 5: significant improvement/ change. The plot illustrates minimum, maximum and average values. Source: own illustration

Most importantly, after attending the workshop about 80% of participants had applied Design Thinking methods in their own projects. These projects ranged from ideation (4) and software development and prototyping (8) to application in business consulting (3). All workshop participants planned to apply Design Thinking methods in their future projects.

Asking for the role of Design Thinking in their future projects reveals the potential benefit participants see in applying Design Thinking. A majority of workshop participants sees the benefit of Design Thinking in supporting an ideation and problem solving process (6). In opinion of the participants, Design Thinking facilitates communication (3) and supports teams with a structured process, i.e. Design Thinking helps to drive teamwork in a more process-oriented way (3). Designers usually apply Design Thinking to identify user needs and communicate early results in form of iterative prototypes. This aspect of Design Thinking however resonates only with a minority of the workshop participants (3).

When asked about settings where it makes sense to include a designer in a team, participants answered as follows: First and foremost, the inclusion of a design requires acceptance by the team itself. Hence a mutual understanding of the benefits and roles of a designer is essential. Designers fit to a lot of projects, but workshop participants see the highest potential in projects with unclear structures that require a structured process to tackle complex tasks (6) as well as in any projects that deal with tangible, physical products (6) and were the interaction with end consumers/ users is heavily required. In the latter case designers are seen as an important mean to facilitate the interaction with users (3).

WORKSHOP IMPACT AT LEVEL 3 - INCUBATION

The third layer denotes the *incubation* of the Design Thinking ethos within the analysed semi-closed ecosphere of the CDTM.

As indicated in the introduction, to analyse how teaching Design Thinking to a limited group of participants affects the surrounding ecosphere on an institutional level, we conducted 33 interviews with non-participants, who are likely to work with workshop participants in other group projects. We interviewed a student body in the age between 20 and 31 years. Most of them were regular students (23), PhD-students (4) or student entrepreneurs (5). The interview group consisted of the following study backgrounds: business studies (14), computer science (11), Engineering (6) or other study programs (2).

To evaluate the impact of the Design Thinking workshop format in a non-design context on an institutional level, we inquired after the conversations participants held with non-participants. Almost all participants (90%) actively talked to non-participants about the workshop, thereby spreading their perception, understanding and opinion. About 35% of the participants even shared some of the workshop material with non-participants.

When asked about prior contact with Design Thinking, 90% confirmed that they had at least heard about it beforehand. Table 6 depicts the sources of information on Design Thinking:

Percentage	Source of information
60%	*Participants of the Design Thinking workshop*
24%	*General media*
24%	*University lecture*
18%	*Friends, family, other acquaintances*
15%	*Specific literature*
9%	*Previous Design Thinking workshop (not at CDTM)*
3%	*Business case*
0%	*Major topic in main studies*

Table 7 - Exposure of non-participants with the topic of Design Thinking

Table 7 illustrates the impact of the Design Thinking workshop in terms of word of mouth on the whole institutional level. This dataset provides evidence that teaching Design Thinking to a limited subgroup of a slightly larger student body tremendously helps to spread the knowledge of Design Thinking.

During the interviews we identified a clear need for an increase in teaching Design Thinking to non-designers. Figure 5 shows a clear gap between the overall interest of non-participants and their personal judgement on their knowledge about Design Thinking. We think that the overall interest in the topic is partially explainable by the high percentage of word-of-mouth "advertisement" by workshop participants.

We see concrete evidence on the hypothesis that teaching Design Thinking to a smaller subset of a larger, yet (on an institutional level) closed student body can infect an entire institution and significantly improve the perception and importance of Design Thinking.

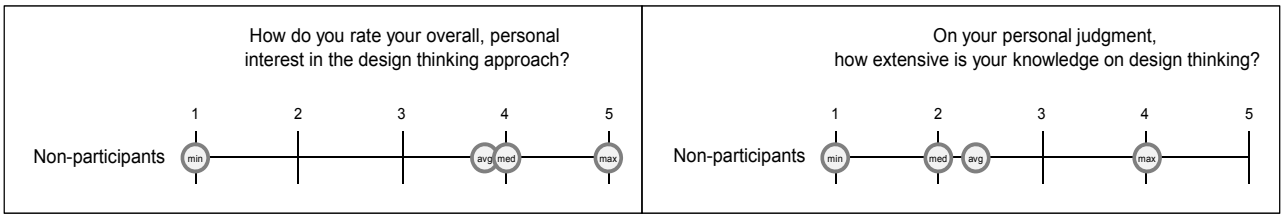

Figure 10 - Quantitative interview results on the overall, personal interest in Design Thinking as well as a personal assessment of the personal knowledge on Design Thinking. Quantitative scaling ranging from 1: absolutely no interest/ knowledge to 5: significant interest/ knowledge. The plot illustrates minimum, maximum, average and median values.

Source: own illustration

Although non-participants' lack of knowledge about Design Thinking needs to be countered by an increase in direct teaching activity, our interviews indicate that an indirect flow of information through the intermediary of workshop participants (i.e. exchange of material or word-of-mouth) can significantly improve the general grasp on Design Thinking within a given ecosystem. Table 8 illustrates the definitions of non-participants in relation to their source of information:

Interviewee	Perceived role of Design Thinking	Source of information
#1	*"I It is about thinking out of the box, how to improve scenes in everyday life […]"*	*workshop participant*
#2	*"Getting/Conceptualizing new ideas by visualisation techniques and by creating models."*	*workshop participant, general media*
#3	*"A method to come up with innovative ideas and solutions systematically."*	*workshop participant, lecture*
#4	*"Approaching problems/challenges of all sorts with the mind-set that their solution needs to be developed from the perspective of comprehensive design, i.e. the person, the context, the materials, etc."*	*workshop participant, business case*
#5	*"A set of creativity methods that are used in a workshop format in order to develop products or services that are radically new."*	*workshop participant, general media, friends*
#6	*"A mind-set to focus on use cases - people, problems, context - when creating a solution (product/service/measure)."*	*workshop participant, specific literature*
#7	*"Creative, systematic and interdisciplinary approach to innovative solutions."*	*general media*
#8	*"It's a methodology and process, which is used to understand and solve a defined problem."*	*workshop participant, specific literature*
#9	*"A design approach that does not focus purely on aesthetics of a product. It rather applies workflows known from design schools to a much larger class of problems. e.g business processes."*	*workshop participant*
#10	*"Design Thinking is a methodology to support the development of user-orientated solutions for any kind of problem/challenge."*	*general media, specific literature, lecture, previous workshop*

Table 8 - Definitions of Design Thinking provided by non-participants – excerpt of interview results

Table 8 further shows that non-participants see the potential to use Design Thinking as means to solve general problems that are not directly related to products or services. Interviewees also understood that Design Thinking rather symbolizes a mind-set. Still a set of definitions assumes that Design Thinking is purely tool and method based.

OPPORTUNITY – DIFFUSION OF DESIGN THINKING IN ACTION-BASED WORKSHOP CHALLENGES

The hands-on structure and two-week urban tasks enabled workshop participants to meet, experience and manage a design-minded process in interdisciplinary teams, generating disruptive, relevant and innovative solutions. Using a combination of theory, cases and action-based tasks, the analysed workshop proved to be an effective way to generate a nuanced understanding and sense of ownership of Design Thinking for the direct participants, but also impacted the incubation of a new mindset on the immediate ecosphere of non-participants surrounding them.

III. FUTURE OF DESIGN THINKING – DESIGN MEETS TECHNOLOGY MANAGEMENT

The workshop, the commitment and dedication of all participating students, the impressive results developed in such a limited time frame by diverse teams of design thinking "novices" testify the effectivity of the chosen workshop format. This raises the question whether the Design world hasn't missed an opportunity in positioning its core ethos: through participation and context-based problem exploration, framing and solving, instead of presentation and marketing efforts.

CONTEXT – KEY TO UNDERSTANDING, OWNERSHIP AND DIFFUSION OF A MINDSET

Design Thinking is unfortunately occasionally hyped as a magic cure-all or a process blueprint for quick, superficial pseudo-solutions of deeply-rooted, structural challenges, which it is not. Instead, it's an attempt to refocus on the *real* (urban) *context* which provides the backdrop for many challenges to be solved by design. It is the combination of real-world exploration of meaningful, relevant human needs and settings with a risk-taking, design-minded approach in leaving one's comfort zone to experiencing and framing specific design thinking challenges that enabled interdisciplinary CDTM teams to manage a design-minded process generating disruptive, relevant and innovative solutions.

It is the same concept of *context* that explains the indirect diffusion of the Design Thinking mindset: the ecosystem in which the workshop takes place can benefit from the gained understanding and ownership of individuals, to spread the knowledge among non-participants, a hitherto underestimated and unresearched field. Thus, when conceiving a workshop it is important to map all contextual elements enabling easy information flow.

FUTURE OUTLOOK – NEXT GENERATION OF DESIGN THINKING AND RESEARCH GOALS

We believe in positioning Design Thinking as a catalyst that has direct and indirect effects of knowledge diffusion within an ecosystem of individuals with diverse academic and professional backgrounds and their specific "thinking" (business thinking, computer science thinking, etc.).
It's time for a new era in teaching Design Thinking: instead of superimposing a new blueprint and discarding the rest, Design Thinking should be adaptively integrated and blended with all the strengths of existing "Thinking" (Business thinking, Technology thinking, etc.). Thus, rather than replacing existing thought processes Design Thinking should complete and connect them, acting as an enabler (Best, 2012) of changing perspective while managing a holistic approach.

It is this promising integration of Design Thinking, Business Thinking and Technology Thinking into a new, integrative, flexible, human-centred, holistic and action-based approach, which enables entirely new insights.

Thus, the Design Thinking workshop initiative, only at its starting point at in spring 2012, strives to enable the development of meaningful solutions (services, products, brands) responding to real, specific and relevant societal human needs, that hold true innovation potential. As a next step, we plan to integrate the findings of this preliminary research into the workshop structure and test the effectivity of our knowledge diffusion model on other research groups of individuals with little prior

exposure to Design Thinking and their respective ecosystems. This includes –but isn't limited to- potential research groups such as decision-makers in the business world, developer teams of cutting edge technology or entrepreneurs.

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Design-Led Innovation in Products and Services

LEADING
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Celine Abecassis-Moedas and Joana Pereira (2012). *Incremental vs. Radical Innovation as a Determinant of Design Position.*

INCREMENTAL VS. RADICAL INNOVATION AS A DETERMINANT OF DESIGN POSITION

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The paper analyzes the determinants behind the choice of contracting external designers when the companies have internal design teams. The methodology follows a multi-case study analysis of seven industrial firms (four plus three of the control group) that use design actively in their activity. The detailed analysis of these cases is done first by analyzing the companies and some of their projects, and second by identifying the determinants behind the decision of using external design.
The results reveal that companies that contract external designers have one of two goals: a) have a 'design breakthrough' perspective – radical innovation; or b) benefit from the association with a recognized designer. In those cases the internal design team is used to do incremental innovations in the product platforms developed by the external designers.

Keywords: design companies, design positions, innovation types.

INTRODUCTION

SPAL, a Portuguese brand and manufacturer of china and ceramics invited a German external designer to create a new shape for a new collection. That seems like a surprising decision as SPAL has a team of seven internal designers. This kind of strategic decisions become common between design companies in several industries, but the question is why are those companies contracting external designers if they have internal design teams?

In the literature the distinction between internal and the external design is clear. While internal design is the usage of the firms' own resources (internal designers) to develop the projects, the external design is the outsourcing of individuals or design agencies. While internal design is the best design position to reduce lead times, to increase efficiency and to reduce development costs; external is the best approach to bring fresh and original ideas that can bring a true competitive advantage to the company (Abecassis-Moedas and Ben Mahmoud-Jouini, 2008; Abecassis-Moedas and Benghozi, 2012). Although the literature in this area is scarce, the shortage is even greater when we talk about the determinants beyond the choice of the design position. This papers aims to fill this gap, answering the research question: Why do companies with internal design teams contract external designers? The research is based on an exploratory multiple case study methodology, with a sample of seven cases (four plus three of the control group), which combine the two design positions: internal and internal & external.

The paper start with a literature review on design positions and innovation types; followed by the methodology, findings, and finally a discussion of the results in light of the literature.

The results reveal that the main determinant of the design position adopted is the level of innovation: external designers are used to provide radical innovation, and internal designers for incremental innovation.

LITERATURE REVIEW

ROLE OF DESIGN IN INNOVATION. WHAT IS DESIGN POSITION?

The success of design-centered firms, such as Nokia, Apple, and Alessi, has positioned design as a way to differentiate and position products (Chiva and Alegre, 2009; Verganti, 2006). In that way, design emerges as a part of the value chain, rather than stand-alone activity (Borja de Mozota, 2003), that is strategically relevant and, when used systematically, can bring a sustainable competitive advantage (Lorenz, 1986; Walsh, 1993). Design is also a way of thinking (Brown, 2008) that creates symbolic value (Kreuzbauer and Malter, 2005; Ravasi and Rindova, 2008) and offers an alternative or a complement to technological changes (Rindova and Petkova, 2007; Walsh, Roy, and Bruce, 1988). Verganti (2008) argues that breakthrough design-driven innovations reflect radical innovations of meanings. To achieve design-driven innovation, firms require a network of interpreters that consists of external designers, publishers, users, artists, suppliers, design services, education, and research (Verganti, 2008).

Benefits of internal design. When the manufacturing or retail firm possesses its own design departments, it gains many advantages: designers get a strong knowledge of the firm and the product, which provides shorter lead times, and reduced development costs (Abeccasis-Moedas and Ben Mahmoud-Jouini, 2008). In this context, design becomes less a creative activity that demands liberty and independence and more a productive activity that sits at the junction of manufacturing and marketing. Design is thus a synthesis of technology and human needs into manufacturing products (Crawford and Di Benedetto, 2003) that integrates interconnected activities such as aesthetics, ergonomics, and ease of manufacture to offer more value when integrated within the firm. When internalized, design also achieves a specific status, because the designers must move across functional and organizational boundaries (Beverland, 2005; Veryzer, 2005).

Research exploring the role of design in the new product development process across multiple industries also shows that incremental product development is more likely by in-house designers (Perks, Cooper and Jones, 2005). Furthermore, Cote-Colisson, Le Louche, and Cygler (1998) suggest that the relative benefits of internal versus external design derive from reactivity, image, and cost.

Benefits of external design. The design activity is a complex intertwining of individual competences and organizational capabilities. Design skills are located in both individual designers (free lancers) and design agencies or consultancies (Walsh, 1996). Hargadon and Sutton (1997) argue that the design consultancy IDEO derives its effectiveness in design from its position as a knowledge broker, working with clients from diverse industries. Their conclusion supports the view that design capabilities are based on rare competencies that are best developed by specialist organizations.

It remains unclear how these skills may interrelate and if the organization drives or restrains individual creativity. Designers, with their creative skills and often eccentric personalities, may not respond well to “normal” modes of management (Florida, 2002), in which case outsourcing creative work may provide an effective solution (Munsh, 2004).

External designers offer fresh and original ideas, free from the constraints of internal institutional barriers. An external designer also is relatively autonomous and can more easily ignore market research and feasibility studies that “may restrain the creative process or alter the original concept” (Ravasi and Lojacono, 2005, p. 59). When outsourced though, such design requires specific inter-organizational contracts that protect the creative freedom of the designers and delineate the expectations of the manufacturers (Bruce and Moger, 1999).

The relative benefits of external versus internal design appear mainly in terms of creativity, innovation, and renewal (Cote-Colisson et al., 1998). Perks et al. (2005) similarly observe that among companies that develop radical new products, some make extensive use of external designers, whereas others rely on combined design teams.

Chiva and Alegre (2007) study the link between companies' design resources (basic skills, specialized skills, skills in involving others, skills in organizational change and innovation skills) and their design positions, concluding that companies that use their internal teams show the greatest emphasis on all skills, while companies that contract external designers shows the least emphasis in all skills.

Radical and incremental innovation

Radical Innovation is the development and implementation of a substantially different product, technology and process (Hill and Rothaermel 2003; Ettlie, Bridges and O'Keefe, 1984), that fulfill a new emerging need (Atuahene-Gima 2005). This kind of innovation is difficult to copy, since it includes a large amount of new knowledge (Dewar and Dutton, 1986), creating in that way value to the company (Hurley and Hult, 1998).

Radical innovations are associated on the one hand with the emergence of new markets and, on the other hand, with the extinction of old ones (Tellis, Prabhu and Chandy, 2009; Sinha and Noble, 2008), being sometimes a risky move. It often requires huge investments in production, distribution and communication (Garica and Calantone, 2002), being the development cycles long and the success rates low (Leifer, McDermott, Colarelli-O'Connor, Peters, Rice and Veryzer, 2000). It also breaks the established structures and requires a strategic repositioning of the business (Ettlie et al.1984), which leads to some opposition inside the companies (Hauschildt 2004).

To be successful, radical innovations require a high proneness to uncertainty (Hill and Rothaermel, 2003; McDermott and O'Connor, 2002), but when they succeed, they are hard to imitate, creating a distinct competitive advantage. The harder to imitate, the more distinctive and durable is the competitive advantage (Koellinger, 2008).

> "Radical innovations advance the price/performance frontier by much more than the existing rate of progress" (Gatignon et al., 2002, p. 1107).

Incremental Innovation is an innovation that evolves minor technology changes in existing products (Atuahene-Gima 2005; Dewar and Dutton, 1986; Gatignon, Tushman, Smith and Anderson, 2002) builds on the firm's current technical capabilities (Benner & Tusman, 2003).

> Its main goal is to keep products competitive in existing markets through adaptations and improvements (Sorescu and Spanjol, 2008; Garcia and Calantone, 2002). Incremental innovations are important to remain competitive, but they have less competitive impact than radical innovations (Christensen, 1997), since they are easier to imitate by competitors (Ettlie et al., 1984; Leifer et al., 2000). Incremental innovations are less risky and less expensive than radical innovations (Dewar and Dutton, 1986), being perceived as less successful than radical ones Gatignon, Tushman, Smith, & Anderson, 2002).
>
> > *"Incremental innovations are those that improve price/performance at a rate consistent with the existing technical trajectory" (Gatignon et al., 2002, p. 1107).*

METHODOLOGY

To answer the research question why do firms with internal design teams use external design we adopt an exploratory multi-case study approach in an attempt to "provide freshness in perspective to an already researched topic" (Eisenhardt, 1989, p. 548). Case study research is particularly suitable for bringing to the surface emerging phenomena whose dimensions remain poorly understood (Yin, 1984). With a multiple case study approach, it is possible to compare the findings across a range of situations, which strengthens the validity of findings and reveals contextual differences.

RESEARCH SETTING AND DATA SAMPLING

Given our interest in identifying the design positions, we rely on theoretical sampling (Strauss and Corbin, 1998). Theoretical sampling is “data gathering driven by concepts derived from the evolving theory and based on concepts of 'making comparisons', whose purpose is to go to places, people, or events that will maximize opportunities to discover variations among concepts and to densify categories in terms of their properties and dimensions” (Strauss and Corbin, 1998; p. 201). This approach increases the probability that we can collect different and varied data on design positions (Strauss and Corbin, 1998; Miles and Huberman, 1994).

The researchers contacted CPD (Centro Portugues de Design) a non-profit institution that works on putting into contact designers and companies. One of their initiative is the Design + that aims at sponsoring young designers for an internship in a design-intensive company, in which they would work, develop a product and present it in an international fair, and therefore gain visibility. 14 companies participated to this initiative and seven agreed to participate in the study and to be interviewed. All the companies in our sample are industrial firms that use design actively, they are national or international companies, operating in the Portuguese market. These firms were selected for their exemplarity in design activity: internal team of designers, willingness to invest in design, national and international reputation; and for their size (number of employees, designers and revenues).

In Table I one the cases are characterized regarding the criteria described below. In order to maintain confidentiality, the company names are omitted, and each case is identified with a number.

Firm	Industry	Activity	Number of employees	Number of designers	Revenues (M €)
1. LARUS	Street furniture	Brand & manufacturer	25	3	1.1
2. REVIGRÉS	Ceramics tiles	Brand & manufacturer	318	3	39
3. SPAL	China tableware	Brand & manufacturer	520	7	15.3
4. LI & FUNG	China, home linen, glass, clothing	Trader, subcontractor & manufacturer	36	12	48
5. PORCEL	China tableware	Brand & manufacturer	73	5	2.7
6. TETRIBÉRICA	Clothing	Subcontractor & manufacturer	26	5	9
7. TOPÁZIO	Silverware	Brand & manufacturer	215	1	10

Table I: List and characteristics of cases

Data Collection

Data were collected through face-to-face interviews and archival documents. The 7 cases are across a range of industries: clothing, ceramics, street furniture and silverware, across a range of positions in the value chain: brands, manufacturers, subcontractors and traders, either B-to-B or B-to-C (see detail in Table I).

We exploited several data sources to facilitate validation and triangulation of the data (Denzin, 1978). The first source of data was interviews with the intern-designer and the head of the design unit (who is often the CEO). We conducted a total of 16 face-to-face interviews. The interviews followed a semi-structured interview protocol (see Appendix A) with open-ended questions and follow-up questions to provide a better understanding and clarification of responses (Spradley, 1979).

The questions were about the following topics: company and respondent characteristics; products and services description; design activity description; design team structure; design position; the reasons behind this choice; and the perceived competitive advantage of the firm.

At the end of each interview, we asked interviewees for comments on any other issues. We guaranteed anonymity to encourage candour. Interviews lasted on average 60 minutes. For each case, the data collected through the interviews were triangulated with archival data such as firm documents (reports), press articles, firm websites, industry reports and company visit.

With this rich and complex qualitative data, first it was possible to explore several hypotheses, ensuring that no rival explanations arise (saturation principle); second, external validity was ensured by including a wide variety of informants and pursuing an extended research project.

Data Analysis

The aim of the data analysis was to analyze the cases to identify the similarities and differences among them. The first four cases were analysed and the last three work as a control group. The researchers performed the data analysis separately and iteratively following two steps: 1) describe the companies and their projects; 2) identify the determinants behind the external design decision.

In the second step, the researchers went through the data doing a descriptive coding (Miles and Huberman, 1994, p. 57) of the design positions determinants and of key elements, balancing the literature and new emerging determinants. At each step of the data analysis, the results were presented by the authors to industry experts, which validated the results as an accurate interpretation of the reality.

FINDINGS

In order to answer the question why would companies with internal design teams also have external designers, we first briefly describe the companies and some of their projects; and secondly we analyzed the determinants behind the decision of contracting external designers (see details in Table II).

Firm	Industry	Activity	Design position	Design prizes	International activity
1. LARUS	Street furniture	Brand & manufacturer	Internal & external	Yes (DME 07, Red Dot, ICSID 08…)	0%
2. REVIGRÉS	Ceramics tiles	Brand & manufacturer	Internal & external	Yes (CPD)	32%
3. SPAL	China tableware	Brand & manufacturer	Internal & external	no	37%
4. LI & FUNG	China, home linen, glass, clothing	Trader, subcontractor & manufacturer	Internal & external	no	100%
5. PORCEL	China tableware	Brand & manufacturer	Internal	no	60%
6. TETRIBÉRICA	Clothing	Subcontractor & manufacturer	Internal	Yes (DME)	84%
7. TOPÁZIO	Silverware	Brand & manufacturer	Internal	no	25%

Table II – Characteristics of the cases

COMPANIES' AND PROJECT DESCRIPTIONS

Larus showed two exemplary lines of product in street furniture. The first one, ‘Axis’ is bench in wood. It is a bestseller product. Its specificity is to use rare and expensive wood. This is a project developed in-house. The second product is ‘Matea’, it is a more radical project. It is a chair that runs on a street track. It is very innovative, but so far sells little. It has been developed with an architect.

Revigres manufactures ceramic tiles, and develops numerous ‘collections’ per year. New products are defined as either new material or new tiles, and then each product is declined in a

large number of final products (with new designs…). The number of new products on the total varies between 36 to 53% over the years. There is even an 'author collection' in which six artists are invited every year to develop a new design (drawing). External designers are therefore brought to reinforce the artistic image of the firm and to add 'names'.

Spal designs and manufactures china tableware. The company has a design team of seven designers. Spal uses external designers in two situations, when acting as a subcontractor for a brand or a retailer, like Ikea, or, when inviting an external designer to design a new collection (a new shape). This later case is quite rare, as a new collection, then has many years of life and can be updated through new designs (drawings) performed by internal designers. Overall around 65% of products are designed internally and 35% externally. For instance, line 303, a new collection was designed by a German designer. She was met at a professional show and she had worked for top firms like Bernardaud and Rosenthal. She made three proposals and the company chose one, and asked for a few alterations. This new line was developed without the involvement of any internal designer. This line is now declined in 30 different decorations (but with the same shape). The name of the external design does not appear, but she is remunerated through royalties, based on sales volume.

Li&Fung is a special case, as it is a Hong-Kong based trader. Their clients (Amazon for kitchen accessories or Ralph Lauren for home linen) ask them to take everything in charge, from design, to manufacturing or the subcontracting of manufacturing. As such, Li&Fung acts as an external designer for its clients. The main reason why clients contract them is because they are able to interface better with manufacturing.

Determinants behind the decision of contracting external designers

The companies that contract outside designer aims to: a) have a 'design breakthrough' perspective; or b) benefit from the association with a recognized designer.

a) The analysis of the four internal & external cases allows us to conclude that companies contract outside designers to change the collection (Spal), meaning to create a new product platform. In these cases, they can subcontract an individual designer or a recognized agency, being both typically anonymous to the market.

b) In some cases, external designers are used as brand name (Larus and Revigres), where the external designer sign the project, bringing reputation to the product line and to the contractor. In these cases the companies use to contract individual designers that usually are superstars, instead of design agencies.

It is also interesting to note that the question of naming or branding is not straightforward. Not all external designers are allowed to brand the product. In the case of Larus, the famous architect signs the product and his name is associated with it. In the case of Spal, the external design gets royalties but no name recognition.

Regarding the first determinant: *have a "design breakthrough" perspective* the firm aims to change the product platform, what can be compared to a radical innovation. In those cases the inside design team is used to slightly change the platform designed by the outside designer, what correspond to incremental innovation. For example, SPAL hired an external design to design a new collection (shape of the products) but uses internal design on a regular basis to create new collections with the same shape (what is changed is the drawings, the color or just some details). In this case, we can clearly identify the radical innovation introduced by the external designer and the incremental innovation done by the internal design team.

Concerning the second determinant, the main goal of the company is to have a product line associated with the designer reputation, but in those situations the outside designers almost always present radical innovation, since their reputations are associated with the product.

Regarding the control group we can conclude that variables like number of employees, number of designers, revenues, design prizes and international activity, doesn't influence the results.

DISCUSSION

Some studies have been developed in this innovation field studying the links of the design positions and the innovation types with other managerial phenomena. For example, Chiva and Alegre (2007) study the link between companies' design resources (e.g. basic skills and specialized skills) and their design positions, concluding that the design position depend on the company's resources focus; Arnold, Fang and Palmatier (2011) analyze the relationship between innovation type (incremental or radical) with customer strategy (retention or acquisition); and Abecassis-Moedas and Benghozi (2012) study the companies' architectures based on their design positions, arriving to five types of architectures. However, few of them, study the relationship between the design position and the innovation type, being this link the main contribution of this paper.

The results reveal that companies use the external designers or to achieve radical innovations or to be associated with recognized designers, while the internal teams are used to ad incremental innovations to the product lines developed by those external designers.

The use of the outside designers to achieve radical innovations are in line with the existing literature (Perks et al., 2005), however the usage of the outside designers as the second driver for contracting outside designers is another important contribution to the field.

The results of this work provide guidelines for firms using design regarding when to use internal and external design, and the appropriateness of combining the two.

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APPENDIX A

Interview protocol

1. What is your position in the company?
2. How long are you in the company?
3. What is the story of the company?
4. Which are the main company products/services?
5. How have been the results improving in the last 3 years?
6. What is the structure of the company?
7. How many people does the design team have?
8. How is the design team organized?
9. Do you contract outside designers or design agencies? and why? (follow up questions)
10. What is your perceiver competitive advantage in the market?

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DESIGN INNOVATION: CONSUMER'S IN-STORE FOOD SHOPPING & MOBILE TECHNOLOGY ASSISTANCE

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Personalized and healthy food choices are increasingly difficult to make, although access to information is rapidly increasing with the explosion of social media and the Internet. But much needed information is not available during in-store shopping environments (i.e. supermarkets). This paper relates various disciplines revolving around in-store consumer product purchasing and food selection, in addition access to information using mobile technology. The paper explores several subtopics, including food and health, consumers' information search and purchasing decision, and mobile recommendation agents (MRAs). Existing theories and knowledge is presented and discussed to establish future opportunities of how design can play an essential role in enhancing consumer's in-store food shopping situations.

Keywords: food shopping; Decision Making Aids; Recommendation Agents

INTRODUCTION

Modern food systems are complex, and food studies are an interdisciplinary field requiring different disciplines to work together (Lang, 1998). A large amount of research has focused on different aspects of food including nutrition related to health impacts, food and culture, food economics, food and the environment, and political impact. With the continuous advancement of technology, this paper begins with an explanation into how future mobile technology can aid in the consumers' food shopping decision-making process. It became apparent that this would be more relevant of the focus was on young consumers, since they have embraced technology already. The three main sections established in the literature relate to in-store food selection, the areas are: (1) Food and Health, (2) Consumer Behaviour, and (3) Mobile Technology. Despite such challenge, this paper attempts to build-up a fair understanding of consumers' in-store shopping behaviour and how might the design of mobile technology tools through mobile recommendation agents (MRA's) assist consumers' access to digital information though dynamic information at the point-of-purchase (P.O.P).

METHODS

This paper is a literature review. It reviews interdisciplinary fields that revolve around consumer food choice and the assistance of mobile recommendation agents and smart products in in-store food shopping environments. This will allow it to build its perspective on existing theories based on research in other fields (such as industrial design, IT, user experience design etc.). This paper

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examines the mentioned above fields to find evidence of mobile technology in relation to food shopping, as a suggested solution and a research path for future designers to consider.

GLOSSARY

The following terms listed below have the following definitions within the paper's context.

Obesity: The result of eating more food than is needed, rather than too little.

Consumer behaviour: The actions that a person takes in purchasing and using products and services, including the mental and social processes that precede and follow these actions.

Smartphone: A device that incorporates capabilities usually found on personal computers, such as Internet access and editing documents, in-addition to basic abilities as making telephone calls.

Mobile recommendation agents (MRAs): A type of recommendation agent (RA) with a specialization on in-store situations intrinsically focused on product information.

Dynamic product interfaces (DPI): Information on products that is presented according to consumer demands that exhibits real-time communication at the local point of interaction.

Smart products: Products that share information with consumers and are designed to combine the online and offline world of information.

Smart Environments: An environment is that is able to acquire and apply knowledge about an environment and to adapt to its inhabitants in order to improve their experience in that environment".

1. FOODS & HEALTH

Food is a subject that touches every aspect of people's lives; it affects our environmental, social, economical and political being. There is a shift in people's perception of processed food, with people increasingly wanting simpler, fresher and healthier food choices. There lies a gap of convenience in food choices. This section discusses the macro impact of health nutrition deterioration on people's health including obesity. It explores current statistics, and introduces consumer food selection.

FOOD NUTRITION DETERIORATION

Food nutrition is a growing topic of concern within the public realm and in health studies. It is a warning sign related to human health deterioration. Researchers within this area including (Lang & Heasman, 2004; Lipton, Edmondson, & Manchester, 1998; Nestle, 2002; Pawlick, 2006; Pollan, 2006) have raised concerns about what is happening to the food supply chain. These researchers examine negative impacts on production; harvesting methods; the use of chemical fertilizers and their effect on food nutrients including minerals, vitamins, and toxic contamination (Lang & Heasman, 2004; Lipton, Edmondson, & Manchester, 1998; Simon, 2006), all of which have an adverse impact on human health through daily food consumption.

This is evident if one compares the current fruits and vegetables sold in the Canadian market today versus the same products sold over 50 years ago (Pawlick, 2006). *Essential vitamins and minerals have noticeably declined in some of Canada's popular foods. The average potato spud has lost 100 percent of its vitamin A, an important element for good eyesight; 57 percent of its vitamin C and iron, a key component of healthy blood; 28 percent of its calcium, essential for building healthy bones and teeth; and 50 percent of its riboflavin, and 18 percent of its thiamine* (Picard, 2009). This food deterioration sample applies to 25 other fruits and vegetables (Picard, 2009). Furthermore, the idea of "convenient food" emerged when the industry produced food designed to be eaten directly out of a package (Nestle, 2002). The choice a person makes between fresh and processed foods, or, what Mayo and Nairn (2009) refer to as yellow foods vs. green foods, have added another layer to harmful eating habits (Mayo & Nairn, 2009), where fresh produce (green food) is free from additives and preservatives.

OBESITY AND HEALTH

The United States has become an economy of overabundance, meaning that the average person is eating more as food becomes abundant and affordable, and at the end, people will become heavier (Pollan, 2006). Pollan's study done in 2006 demonstrates the difference between caloric intake in the late 90s and types of substances consumed since 1985. Since 1997, the average American's daily intake of calories has jumped by more than 10 percent (Pollan, 2006). In addition, the lack of physical activity and the extra caloric intake enable these excess calories to be stored in human fat cells (Pollan, 2006). *Moreover, since 1985, consumption of all added sugars including cane, beet, high fructose, corn syrup, glucose, honey and maple syrup jumped from 128 pounds to 158 pounds per person in the U.S, mostly consumed through soft drinks* (Pollan, 2006).

As a result of food nutrition deterioration and unhealthy diets based on excessive consumption of fats and sugars, the major global health issues facing the world today are obesity and common illnesses (Klanten, 2008). The World Health Organization predicts that by 2015, roughly 2.3 billion adults worldwide will be overweight, and more than 700 million will be obese; in other words, there will be an obesity epidemic (Klanten, 2008). Obesity-the result of eating more food than is needed, rather than too little, is arguably the most pressing public health problem facing the United States; three of every five Americans are overweight; one of every five is obese (Muñoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997; Pollan, 2006).

Amongst other reasons that contribute to overconsumption is the use of food advertising. The U.S food industry spent more than $33 billion at the turn of the century. Most of this large sum is used to promote the most highly processed, elaborately packaged, fast food available (Endtcott, 2001; Nestle, 2002). In addition to lower food prices and lower food production (Dunham, 1994). In 2006, it was estimated that obesity is costing the U.S health care system approximately $90 billion per year (Pollan, 2006).

FOOD CHOICE

In an economy of abundant food choice, the primary selling factors are: taste, cost, convenience, and public confusion. In 2002, nutrition ranked as the last factor for marketing a food product (Nestle, 2002)**.** According to Nestle, the main determinants of food choice are personal preferences, where basic biological needs become less compelling (2002).

Food influences one's life as a relevant maker of power, cultural capital, class, gender, ethnicity, and religious identities (Parasecoli, 2008)**.** *In reality, only affluent consumers have significant food choice; middle-income consumers have rather less, and the poor have next to none* (Lang & Heasman, 2004)**.** And beneath the layer of consumer choice, there is a prominent shrinkage in the number of food stores that consumers can buy food from; about half of all the food and drink purchased in the UK now comes from just one thousand hypermarket outlets controlled by four dominant retail companies (Lang & Heasman, 2004). The story is similar to food markets in North America.

2. CONSUMER BEHAVIOUR

The disciplines of psychology, sociology and marketing have extensively studied consumer behaviour to understand when, why, how and where people purchase products and services in attempt to understand the buyer's decision-making process. Several models of the consumer buying process have been developed by marketing scholars, the most prominent being proposed by (Engel, Blackwell, & Kollat, 1978), (Howard & Sheth, 1969), and (Nicosia, 1966). Although these models vary in their detail, there are five stages, which consistently occur in marketing studies. The models are most relevant to complicated decision-making, in which significant amounts of risk are involved (See below figure 1.0).

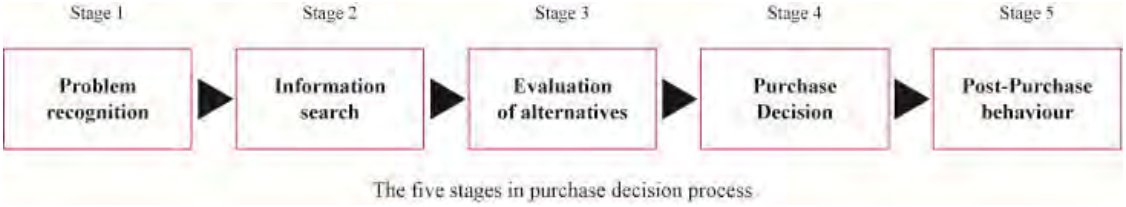

Figure 1.0 The Purchase Decision Process in Marketing

In retailer environments such as supermarkets, innovation is key to enhance customer-shopping experience, satisfaction, and to win customer loyalty. *Traditional levers of price, location and selection alone are still important but not enough; alone they are no longer sufficient in order to achieve competitive differentiation* (Roussos, Gershman, & Kourouthanassis, 2004). The following section reviews traditional consumer behaviour theories to set the stage for the third section of mobile technology.

DEFINING CONSUMER BEHAVIOUR

Consumer behaviour is defined as “the actions that a person takes in purchasing and using products and services, including the mental and social processes that precede and follow these actions” (Crane, Kerin, Hartley, & Rudelius, 2008, p. 116).

Compliant in marketing studies, the purchase decision-process, which are the stages a buyer goes through when making choices about which products and services to buy, is composed of five stages: (1) problem recognition, (2) information search, (3) evaluation of alternatives, (4) purchase decision, and (5) post-purchase behaviour (Crane, Kerin, Hartley, & Rudelius, 2008; Mitchell & Boustani, 1994). The focus of this paper is mainly on the second, third, and fourth stages of the purchase-decision process, respective to the overall research topic, which are (2) information search; (3) evaluation of alternatives; and (4) purchase decision. The paper will discuss each stage in-depth to lay down a foundation for the last section of this paper, which discusses how the integration of mobile technology can assist consumers in making a better shopping decision in in-store supermarkets.

INFORMATION SEARCH; STAGE (2) OF THE CONSUMER DECISION-PROCESS

In purchasing, one is engaged in problem solving for which information and facts are required for understanding the purchase decision-process to assist consumers meet their information needs (Newman & Lockeman, 1975). Product information influences product purchases. The pre-purchase information search stage, the second stage in consumer purchase decision-process, is a critical phase that simplifies purchasing decision criteria for the consumer by yielding competing brand names and suggesting criteria to use to judge the various brands, in addition to developing consumer value perceptions (Crane, Kerin, Hartley, & Rudelius, 2008).

ACTIVE SEARCH AND PASSIVE SEARCH

There are two identified types of searches when the consumer decides to search and collect information, the search may either be (1) active or (2) passive. *Active searches involve consumers obtaining data from various information sources, which can be sorted as personal (i.e. family and friends, neighbours, etc.); commercial (i.e. advertising, packaging, sales representatives, etc.); public (i.e. media sources, consumer organizations); and experiential (i.e. testing, examining, and using the product)* (Cox, 1967).

For passive searches, a consumer may start with an internal search by a memory scan of previous experiences with a product or brand (Alba & Hutchinson, 2000). *For frequently purchased products, such as toothpaste, this may be enough. When past experience or knowledge is insufficient, a consumer may undertake an external search for information because the risk of making a wrong purchase decision is high, and the cost of gathering information often is low* (Moorthy, Ratchford, & Talukdar, 1997; Urbany, Dickson, & Wilkie, 1989). *The primary sources for*

external information a consumer seeks are (1) personal sources, such as family and friends; (2) public sources, such as product-rating organizations, consumer reports, and TV programs; and (3) marketer sources, such as information from the seller including advertisements, company website, and point-of-purchase display stores (Crane, Kerin, Hartley, & Rudelius, 2008).

The information that a consumer seeks prior to the purchase decision is of great value, but at the same time, the more sources used, the greater the amount of data and the greater the likelihood of conflicting reports being received, which may result in confusion due to information overload. Furthermore, information acquisition may alert consumers to risks and pitfalls within the product that they had previously been unaware of. This is an important consideration for UX designers or industrial designers; creating information limitations for certain products maybe a positive impact on consumers when shopping in-stores.

INFORMATION SEARCH RISK REDUCTION

There are two general types of uncertainty: knowledge uncertainty (uncertainty regarding information about alternatives) and choice uncertainty (uncertainty about which alternative to choose). Choice uncertainty appears to increase the need for information search; while knowledge uncertainty has a weaker, negative effect (Urbany, Dickson, & Wilkie, 1989). Pre-purchase risk reduction essentially focuses on increasing the amount of certainty that a satisfactory product will be purchased as well as reducing the negative consequences should the purchase be unsatisfactory (Mitchell & Boustani, 1994).

EVALUATION OF ALTERNATIVES; STAGE (3) OF THE CONSUMER DECISION-PROCESS

The criteria a consumer considers when evaluating products to purchase are called evaluation criteria. These are factors that present both the (1) objective attributes of a brand (such as picture quality of a camera) and the (2) subjective attributes (such as brand image) that are then used to compare different products and brands (Hawkins, Mothersbaugh, & Best, 2007). This stage is fundamentally concerned with how the consumer chooses between alternative products and brands, an important factor to study to understand consumer behaviour when faced with the purchase of products and services.

A MODE TO DECREASE UNCERTAINTY

The first source of uncertainty is which criteria or attributes consumers should use to judge products. The consumer may also be unsure about how important the possession of each attribute is (i.e. organic yogurt vs. low-fat yogurt). Cox has suggested that each information cue, such as an attribute, has a predictive value, which is defined as how well the attribute will predict the future performance of the product (1967). The consumer, however, can never be sure about the usefulness of these predictive values (Cox, 1967). *Depending on the complexity of the offering, overall risk perception should continue to fall during the evaluation phase, but may rise slightly just before the decision is taken, as last minute indecision causes an increase in uncertainty* (Mitchell & Boustani, 1994).

PURCHASE DECISION; STAGE (4) OF THE CONSUMER DECISION-PROCESS

According to Crane, Kerin, Hartley, and Rudelius, "learning refers to those behaviours that result from repeated experience and thinking" (2008, p. 124). Much consumer behaviour is learned over time (Crane, Kerin, Hartley, & Rudelius, 2008). Consumers learn which sources are best to use for information about products and services, which evaluative criteria to use when assessing alternatives, and, more generally, how to make purchase-decisions. Understanding how consumers approach a purchase decision is a critical knowledge for interdisciplinary studies when dealing with the purchase of products and services, in this case, in-store supermarket food shopping.

During the purchase decision stage, a buyer has two remaining choices: (1) from whom to buy, and (2) when to buy. Often, a purchase decision involves a simultaneous evaluation of both

product attributes and seller characteristics (Crane, Kerin, Hartley, & Rudelius, 2008). According to Hoyer & MacInnis (2004) and Mowen & Minor (1998), consumers often do not engage in all the five-stage purchase decision process, depending on the personal, social, and economic significance of the purchase to the customer. Thus, this part of the process is dependent upon the level of involvement for the consumer. Instead, consumers skip or minimize one or more stages (Hoyer & MacInnis, 2004; Mowen & Minor, 1998).

PURCHASE LEVEL OF INVOLVEMENT

When studying consumer behaviour related to food shopping in-store, it is important to make distinction of the level of involvement a consumer goes through when choosing a food product. This part looks at existing theories and research in this area.

Product class involvement is defined as the overall consumer's involvement with specific attributes of a product. In this case, food is the product category. Product involvement is divided into two circumstances: (1) High-involvement purchases and (2) Low-involvement purchases. *High-involvement purchase occasions typically have at least one of three characteristics; (1) expensive; (2) have serious personal consequences; and (3) reflects one's image. For those occasions, consumers engage in an extensive information search, and consider many product attributes and brands. Low-involvement purchases such as soap and toothpaste require "virtually no consumer participation"* (Crane, Kerin, Hartley, & Rudelius, 2008, p. 118).

Low-involvement purchases are also referred to as a routine problem solving. For product purchases such as table salt and milk, consumers recognize a problem, make a decision, and spend little effort seeking external information and evaluating alternatives (Crane, Kerin, Hartley, & Rudelius, 2008). The purchase process for such items is virtually a habit and illustrates low-involvement decision-making. Routine problem solving is typically the case for low-priced, frequently purchased products (Crane, Kerin, Hartley, & Rudelius, 2008, p. 119).

It is difficult to quantify consumer information searches (Newman & Lockeman, 1975). In studying consumer information searches as part of purchasing behaviour, little or no information searches could have various meanings. Newman & Lockeman suggest that the purchaser may have known enough information to buy without the need to acquire more information (1975).

INFLUENCES ON FOOD SHOPPING

Influences on a buyer's shopping experiences are distinguished by (1) emotional impressions that affect customers' moods and (2) product information that affects rational decision-making (Groeppel & Bloch, 1990). The main influencing factors for food choices are the lived experiences a consumer has gone through, the different mind-sets a consumer brings to the food choice scenarios and personal indicators that consumers have developed over time through various food choice experiences (van der Merwe, Kempen, Breedt, & de Beer, 2010). When it comes to food products, there is a discrepancy between researchers to what kinds of foods are considered high involvement vs. low involvement. Further research is required to identify different food product categories.

Moorthy, Tatchford & Talukdar have defined price, taste, nutrition, ease of preparation and brand as variables that measure product involvement in food selection (1997). Other researchers have also found these factors to be important when making food-purchasing decisions (Rose, 1994; Thayer, 1997).

FOOD LABEL INFORMATION

After introducing some knowledge and theories in the general scheme of consumer behaviour, this section will relate some of the research to food products, which is the heart of this paper. *Focusing on food shopping in the in-store environment, the main method for customers to learn about health-related information about a food product is by reading food labels. Food labels are information sources that provide knowledge about food items and dietary intake* (Dimara & Skuras, 2005;

Jordan Lin, Lee, & Yen, 2004). The food label is associated with food purchase decisions that assist consumers in making food choices (Kriflik & Yeatman, 2005) according to (Baltas, 2001; Cotugna & Vickery, 1998; Davies, 2000). If consumers understand and use the nutrition information correctly, it will assist them in maintaining a healthy diet or lifestyle. This emphasizes the importance of informative food labels, as they are currently the major health information a customer can use to make his or her food choice during in-store food purchasing.

NUTRITION LABEL

In May 1994, the 1990 Nutrition Labeling and Education Act (NLEA) mandated that most processed foods under the jurisdiction of the Food and Drug Administration (FDA) would display nutrition information presented in a "Nutrition Facts" label format panel (Cotugna & Vickery, 1998). The goal of the food label is to provide nutrition information that is consistent, readable, understandable, and useful to consumers for selecting a more healthy diet (Sims, 1993). The ability to understand and use food labels is necessary for consumers to be able to make food choices to achieve a more healthful diet (Cotugna & Vickery, 1998). But food labels do not always convey comprehensive contents or the origins and nature of production. Food labels cannot tell the full story of what went into the food or its health attributes due to its static form (Lang & Heasman, 2004).

A study report by the ministry of agriculture fisheries and food in the U.K found that nutrition information on food packaging is often difficult for consumers to understand. For example, when participants were asked to read figures from a nutrition label, or make comparisons of nutrient levels between two labels, a third of respondents were unable to answer (Rayner, Boaz, & Higginson, 2001). Thus, improvements to the format of nutrition information on food packaging can aid consumer understanding (Guthrie, Derby, & Levy, 1999).

LABEL ENDORSEMENT PROGRAMS

Due to the illegibility of nutrition labels for consumers, food companies have designed symbols that resemble a health-related food label choice in order for consumers to avoid much information processing on nutrition labels that are difficult to understand. The objective of this strategy is to reduce the confusion and difficulty of understanding the label (Rayner, Boaz, & Higginson, 2001). Health-related food endorsement labels on product packaging mark food products as healthy or healthier choices (Raats, Royce, & Stockley, 2007).

However, an endorsement label does not substitute health information from other information on food packages. Instead of replacing existing information, endorsement labels have become an extra piece of information added to be gathered, processed, and evaluated by consumers. Numerous shoppers who use health endorsement labels also try to look for evidence to support the endorsement rather than putting all of their faith in it (Rayner, Boaz, & Higginson, 2001).

THE CHALLENGE WITH STATIC FOOD LABEL INFORMATION

Up to this day, supermarkets provide consumers with static product information in the form of printed product package labels. This kind of food product information does not adapt to consumer needs. Static label information does not provide the ability to compare prices and access consumer opinions on a product, which is part of an overall product purchase decision (Maass & Kowatsch, 2008, p. 1). That is where consumers usually use the Internet as an accessible source of product information at home or at work. But this information is not easy to access at the point of purchase in-store shopping. In part, this is because many purchases are ad hoc, that is, made on instinct (Resatsch, Sandner, Leimeister, & Krcmar, 2008).

Thus, the consumer must rely on the expertise, skill and trustworthiness of sales assistants in providing viable product information at the point of purchase (PoP). According to (Bettman, 1973; Mitchell & Boustani, 1994), the lack of knowledge and information about a product can make this purchase decision difficult (Resatsch, Sandner, Leimeister, & Krcmar, 2008). And the main purpose of the pre-purchase risk reduction essentially focuses on increasing the amount of

certainty that a satisfactory product will be purchased as well as reducing the negative consequences should the purchase be unsatisfactory (Mitchell & Boustani, 1994).

This is where the introduction of *dynamic product information* comes in to leverage these limitations, information that is provided by mobile recommendation agents (MRAs) at the point of purchase (P.O.P) in a mobile location (Maass & Kowatsch, 2008, p. 1)

3. MOBILE TECHNOLOGY

This section introduces the technology part of the literature review. This section focuses on mobile technology, and how it can aid consumers' access to information in in-store environments at the point of purchase (P.O.P).

THE MOBILE SMARTPHONE INDUSTRY

The following numbers put into perspective the recent explosion in mobile technology, specifically mobile smartphone usage. From 1992 to 2010, the number of mobile phone users has increased from 23 million to 5.4 billion worldwide. Consequently, from 1993 to 2012, the number of Internet users grew from 10 million to 2 billion (BBC News, 2012; UNEP, 2011). In another research study, the number of global mobile users was 5.3 billion (76 percent of the world's population). There are all users connected to each other through mobile devices (International Telecommunication Union, 2011). Mobile devices are emerging as principal tools for information transfer between users.

In 2010, Canada had an estimated 5 million users of the iPhone and other smartphones; these on-the-go computers are making regular cell phones out-of-date (Lombardi, 2010), and these numbers continue to grow. The acceptance of smartphone devices has risen due to (1) rapidly increasing repurchase rates and (2) a rise in the tendency for consumers to own more than one phone device. Price competition can also be attributed to the global expansion in the mobile industry, including the evolving applications and mobile entertainment services industry (Kımıloğlu, Nasır, & Nasır, 2010).

MOBILE SMARTPHONES AND USERS

Many consumer lifestyles are becoming increasingly dependent on their mobility; the value of products enabling people to work, communicate or entertain themselves in a location-free manner has risen accordingly. One of the most obvious examples of this product type is the mobile phone. Mobile devices are evolving into permanent companions of consumers (Nath, Reynolds, & Want, 2006). In many developed countries, including Canada and the U.S, the mobile phone penetration is well above 90 percent, meaning that almost everybody is using a mobile phone.

New mobile devices, known as smartphones, provide extended functionalities such as Internet connection and mobile barcode recognition, knows as NFC technology (Near Field Communication) (Nath, Reynolds, & Want, 2006). *Smartphones with Internet capabilities allows people for the first time to generate content and share experiences with products independent of computers fixed to specific locations. Moreover, with the ability of emerging auto-ID capabilities, such as NFC technology, simplifies linking information to products, and thus lowers the barriers for users to access content on the-go* (Reischach, Guinard, Michahelles, & Fleisch, 2009, p. 1). Current mobile providers should aim to offer unique and competitive products that incorporate attributes appropriate to individual needs. To achieve such objectives, a more thorough understanding of consumers is necessary (Kımıloğlu, Nasır, & Nasır, 2010).

CONSUMER INFORMATION SEARCH USING MOBILE TECHNOLOGY

Newman and Lockman (1975) found that considerable information search prior to purchase takes place in the store itself (Newman & Lockeman, 1975). Product experience and product communication take significant roles in influencing consumer preferences and behaviour (Narayanan, Manchanda, & Chintagunta, 2005).

In 2011, mobile smartphones accounted for about 19 percent of all web traffic in the UK. Compared to 2009, that figure was only 0.02 percent. The rise in mobile web browsing has been dramatic and will continue to rise as phones become faster and smarter, and more people use them (Caterer & Hotelkeeper, 2011). Furthermore, the proportion of visitors booking services and purchasing goods is considerably higher on a mobile site than a standard website. Google statistics suggest that 88 percent of people looking for local information on their smart-phone follow through with an action relating to that information within 24 hours. That can be, for example, looking for a restaurant to dine and making a booking (Caterer & Hotelkeeper, 2011). This is referred to as "action oriented browsing". When one looks for information on a mobile phone, it is when one want to do something with that information. Browsing through a mobile phone has a purpose (Caterer & Hotelkeeper, 2011).

MOBILE APPLICATIONS

Harmoniously, mobile applications are currently being developed for consumers to communicate with physical products (Maass & Varshney, 2008). Thus mobile shopping assistants as Impulse (Youll, Morris, & Maes, 2000), MyGrocer (Kourouthanassis & Roussos, 2003), Massi (Kowatsch & Maass, 2010), the Mobile Prosumer (Resatsch, Sandner, Leimeister, & Krcmar, 2008), EasiShop (Keegan, O'Hare, & O'Grady, 2008), all allow consumers for requesting product information directly at the point of purchase (P.O.P). This, theoretically, allows physical products to be enriched with new digital product information services relevant to the consumer needs. But in testing existing applications, the majority of products in a supermarket shelf do not have information database, and the overall environment including technology, does not support these mobile applications. Technology infrastructure needs to be created in order to have a cohesive smart environment.

SMARTPHONES AND GROCERY SHOPPING

Three problems grocery shoppers hope smartphones can help them with are: the cost of the product; where it can be found in-store; and backstory information such as the origin of the product and its ingredients (Lombardi, 2010, p. 1). For grocers, developing smartphone apps means thinking not just about the information consumers want when they're in the stores, but what happens before and after, says Sakaria[*]. *Right now, no one's offering an integrated shopping solution that helps consumers through the whole process: seeing a recipe on the Food Network, then generating a shopping list, finding the ingredients and how much they cost, and so on* (Lombardi, 2010, p. 2). Thus, there are exposed and promising opportunities that designers and design in general play a role in developing mobile tools for consumers to use during in-store shopping. This applies to a variety of retail environments including supermarkets.

RECOMMENDATION AGENTS

Consumers depend on precise and comprehensible product information during pre-purchase stage and at the point of purchase stage. Product information strongly influences purchase behaviour as evidenced by consumer research for in-store shopping situations (Tellis & Gaeth, 1990).

RECOMMENDATION AGENTS IN ONLINE PURCHASING

In the case of online purchase situations, the value of product information can be increased further with the use of recommendation agents (RA) as they elicit the interests or preferences of individual users for products by making recommendations accordingly (Xiao & Benbasat, 2007) according to (Maass & Kowatsch, 2008, p. 2). In this sense, product information provided by online RAs becomes adaptive and therefore more relevant to individual consumers' information needs, whereas product information on printed product labels is static by definition. Correspondingly, several studies revealed that online RAs help to reduce search complexity and consumers' information overload (Häubl & Trifts, 2000; Todd & Benbasat, 1999), improve decision quality (Pereira, 2001),

[*] *Neela Sakaria is the vice-president of Latitude, a digital consultancy based in Beverly, Massachusetts*

increase trust in decisions (Gregor & Benbasat, 1999), and finally influence the ingredients a consumer has available (i.e. allrecipes.com).

Xiao and Benbasat define integrated sets of recommendation services as "*software agents that elicit the interest or preferences of individual users for products either explicitly or implicitly, and make recommendations accordingly*" (2007, p. 137). Several studies showed that RAs provide value-added services that help to reduce customer's information overload in shopping situations and reduce search complexity (Häubl & Trifts, 2000; Todd & Benbasat, 1999), improve decision quality (Pereira, 2001), and increase trust in decisions (Gregor & Benbasat, 1999). Mobile recommendation agents (MRAs) are counted as a type of RA with a specialization on in-store situations (van der Heijden, 2006).

MOBILE RECOMMENDATION AGENTS (MRAS) IN IN-STORE PURCHASING

This section is of high significance to the paper's topic. The use and impact of mobile recommendation agents (MRAs) in in-store shopping situations are a significant issue from both consumers' and retailers' perspective (Kowatsch & Maass, 2010). Until now, little research has been conducted on the utility of MRAs for in-store purchase decision-making. In a lab experiment conducted by Maass & Kowatsch (2008), it was founded that product information provided by mobile recommendation agents (MRA) was perceived as being better than static product information (i.e. information printed on food labels) particularly for product bundle purchases in in-store situations (Kowatsch, Maass, Filler, & Janzen, 2008; Maass & Kowatsch, 2008). Further, MRAs improves the quality of product consideration set (van der Heijden, 2006).

By using a mobile recommendation agent (MRA), product information asymmetry between producers and consumers can be reduced in front of the product shelf. *For instance, product reviews provided by professional magazines or user-communities via the MRA may reveal information about the quality of a product, and this may change the purchase behaviour* (Reischach, Guinard, Michahelles, & Fleisch, 2009). The MRA supports consumers in buying situations as it helps them to find relevant product information. With higher degrees of perceived usefulness of the MRA's, buying intentions are increased as relevant information for purchase decisions is provided. This relation is also supported by marketing and information system research (Kamis, Koufaris, & Stern, 2008; Tellis & Gaeth, 1990). MRAs are intrinsically focused on product information (van der Heijden, 2006). The value of product information is increased by the use of mobile recommendation agents as information adapts dynamically to the interests and preferences of consumers (Kowatsch & Maass, 2010).

A GROWING FIELD OF RESEARCH

Mobile recommendation services are a relatively new research field that specializes research on recommendation services with a stronger emphasis of physical and social contexts, and limitations given by smaller technical devices (van der Heijden, 2006). Recent studies showed that the importance of efficient information coding systems help to reduce cognitive load (van der Heijden, 2006). Kleijnen, de Ruyter & Wetzels (2007) showed that benefits (i.e. time convenience, user control and service compatibility), and costs (i.e. risk and cognitive effort), affect the intention to use mobile recommendation services. But on the business side consumers are currently not willing to pay for mobile services for cost reasons and lack of appropriate content (Kleijnen, de Ruyter, & Wetzels, 2007).

MRAs provide new means to reduce information asymmetries between consumers, retailers and producers. Online shopping at home differs in many ways from mobile contexts (Venkatesh, Ramesh, & Massey, 2003). In-store situations are interactive and dialogue-oriented. MRAs are currently emerging in various prototypical designs. In particular, retailers are testing their potentials. *MRAs are perceived as a means for delivering product information into in-store purchase decision situations* (Maass & Kowatsch, 2008).

DYNAMIC PRODUCT INTERFACE

"Dynamic product information (DPI) is defined as information on products that is presented according to consumer demands" (Maass & Kowatsch, 2008).

"With the growth of digital media, product information has exploded" (Maass & Janzen, 2007). Product information and tangible products are commonly used in separated situations. For example, information created for supporting purchase decisions is offered on the Internet through a company's website, and can reduce overall search costs (Bakos, 1997). But this information is currently not available in tangible shopping environments. Empirical studies indicate that consumer groups, such as shopping lovers would intend to use value-added shopping services in tangible shopping environments that provide, for instance, shopping alerts and product information (Mort & Drennan, 2005).

The merger between physical tangible products and virtual information is referred to as *Smart product* (Maass & Janzen, 2007). *This is value-added mobile service that allows embedding of digital product information into tangible products and thus supporting product-mediated communication between products and users* (Maass & Filler, 2006). This approach enables new forms of product interfaces by merging information user interface design and industrial product design.

SMART PRODUCTS

This is where the introduction of the "Smart products" comes in, bridging the gap between offline and online information. *Smart products are products that share information with consumers and are designed to combine the online and offline world of information. Smart products can be defined as products with digital representations that enable adaptation to situations and consumers* (Resatsch, Sandner, Leimeister, & Krcmar, 2008, p. 218). In Mühlhäuser, the author defines a smart product as *an entity (tangible object, software, or service) designed and made for self-organized embedding into different (smart) environments in the course of its lifecycle, providing improved simplicity and openness through improved p2u and p2p interaction by means of context awareness, semantic self-description, proactive behaviour, multimodal natural interfaces, AI planning, and machine learning* (2008).

SMART PRODUCTS FOR CONSUMERS

Smart products communicate with the consumer and also enable new ways of interaction. Today's in-store products provide only static information, future smart products may provide information about their journey to their current location (i.e. multiple countries of origin), information about their ingredients (i.e. news articles on problems with a particular supplier) and possibly some embedded intelligence that determines the customer's needs (i.e. the types of difficulties others have had in assembling the product) (Fleisch & Thiesse, 2007) according to (Resatsch, Sandner, Leimeister, & Krcmar, 2008, p. 218).

Useful information, such as user-generated product ratings, product reviews, or opinions from friends and family would be a great help at purchase time. "Smart products and smart product information services are sought to help lower negative influences on purchase decisions, such as uncertainty and making shopping a more positive experience (Resatsch, Sandner, Leimeister, & Krcmar, 2008, p. 217)

SMART PRODUCTS FOR RETAILERS

Smart products give physical store operators in today's world of intense online shopping the possibility to compete with online retailers by providing direct access to the online information (Maass & Janzen, 2007; Roussos, 2005; Smith, Davenport, & Hwa, 2003) according to (Resatsch, Sandner, Leimeister, & Krcmar, 2008, p. 218). *Smart products can also act as a process interface and information source for retailers (i.e. How many times the product has been picked up by customers* (Resatsch, Sandner, Leimeister, & Krcmar, 2008, p. 218). *Smart product information has a wide application through retail environments by merging physical products and information*

products into so-called smart products (Loebbecke & Palmer, 2006) according to (Resatsch, Sandner, Leimeister, & Krcmar, 2008, p. 218).

SMART ENVIRONMENTS

Definitions for *Smart Environments* may be taken into account as a first reference, since smart products have to be considered in the context of their smart environment as argued above. Such a definition can be found in Das & Cook (2006)، "A Smart Environment is one that is able to acquire and apply knowledge about an environment and to adapt to its inhabitants in order to improve their experience in that environment".

Smart environments must exhibit a certain level of intelligence, in which *smart product environment can act as a recommendation system by suggesting what products match what the customer is looking for at their location. And if the inventory does not have those products, the environment should be able to proactively order the products* (Maass & Varshney, 2008).

DISCUSSION

Designers need to understand the relationship between human consumer behaviour and food products whilst food shopping. By understanding the user experience through interdisciplinary studies, design-led innovation in products and services can occur. The use of existing mobile technologies could offer practical solutions in the realm of food shopping. Industrial designers and user experience designer can develop tools that can play a role in developing a more sustainable, informative, and personalized food-shopping experience.

Smart products and mobile technology can play an essential role in part of the solutions as evidence reveals. Products are increasingly required to intelligently adapt to consumer's needs and changes in usage situations. The future of such smart products will involve having considerable intelligence embedded in food product. Current approaches supporting consumers in their buying decision are, amongst others, provided through web-based product recommendation (RAs) systems. This paper sheds light on how the use of mobile recommendation agents (MRAs) can play an important factor in in-store environments. They allow users to submit experiences they have made with particular products and to share them with other users in a community. Moreover, MRAs allow access to rich information in a location free manner at the point of purchase.

The following is an initial set of recommendations for designers to considered when designing smart mobile tools that enable consumers to access product information that assists in food shopping. The tools may perform the following functionalities:

- Quickly identify the product
- Quickly discover online information
  - Health and nutrition facts
  - Ingredients and their health attributes
  - Production methods and environmental impact
- Access to online community for product reviews
  - Popularity (love or hate)
- Product pricing
- Compare product from other brands
- Easily generate a shopping list with recommendations based on personal preferences
- Connect to online recipes

The tool needs to quickly update any information as per dynamic information requires. This is only a primary recommended list that designers can take forward and expand based on future research.

CONCLUSION

Information is the starting point for any design. Information creates knowledge, and in food-related design, can lead to accessibility to rich personalized food information, which can contribute to a more positive shopping experience. Holistically, food is a topic that touches every aspect of society; food has environmental, economic, political, and cultural impacts. Design thinking can play a positive role in enhancing the relationship between humans and food, specifically in building this relationship in an in-store supermarket environment.

Mobile technology is evolving, and from the reviewed literature, mobile recommendation agents seem to provide the opportunity for consumers, producer, and retailers to access rich information on the move, which can be designed to be compatible with evolving smartphone technologies. Relevant information is the key driver in order for consumers to make healthier food choices through quality nutrition and mobile technology tools can assist in these decisions.

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LEADING
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MANAGING INNOVATION THROUGH PARTICIPATORY PROCESSES

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The paper reflects on the role of Design in specific research projects where: (i) the field of intervention is a geographical area, with its resources and opportunities; (ii) the approach adopted is participatory, including potential stakeholders in the development of solutions; (iii) the funding comes from public institutions or private foundations, thus the owner of the solutions generated is not predefined. In these projects Design assumes a leading role, guiding the process and facilitating the alignment of stakeholders. In this framework the ownership of the project emerges as a major issue after the funding finishes. Therefore a discussion on Design strategies to manage the transition from a protected testing environment towards self-sustainable solutions implemented in the market is presented on the basis of a Life 2.0 project experience.

Keywords: Participatory Design; Ownership; Business Model.

1. THE ROLE OF DESIGN IN TERRITORIAL PROJECTS

1.1 FIELD OF INTERVENTION

In recent years design projects have moved from single products and services to large-scale interventions aimed at producing a sustainable change in a district, city or region by developing small and localized solutions to be then scaled up and diffused (Manzini, Rizzo, 2011; Meroni, 2011; Thackara, 2007).

An example of this kind of intervention is the one initiated by the media institute MEDEA at Malmö University, with financial support from the KK-foundation and EU structural funds, when in 2009 it launched three Living Labs for co-production and social innovation in the city of Malmö. The city is characterized by multi ethnicity, cultural production, youth culture and new media industry. This is also the rationale behind the content orientation and cultural and geographic position of the three Living Labs. These are: "The Neighbourhood", positioned in contentious multi ethnic Rosengård and focusing on changes in urban space, collaborative services and social media; "The Stage", situated in the vibrant environment of clubs, music, theatre and sub-culture around Möllevångstorget and focusing on cultural production and cross media; "The Factory", located at the skateboard arena Stapelbäddsparken in Västra Hamnen, in the heart of the new media cluster in the city, focusing on innovation strategies where users can develop fully functional prototypes in an open source, mixed-media environment. Each living lab is conducting a series of self-standing

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projects, aided by new technologies, to boost social innovation initiatives to regenerate the communities that live in these places (Bjorgvinsson, Ehn, Hillgren, 2009).

In the different contexts the strategy to deal with such changes is to include local stakeholders right from the beginning of the project by adopting a participatory approach with the people directly affected by the project results (Cantù, Corubolo, Simeone, 2012). This practice has generated many successful projects since the first experiments were carried out (e.g. Dott07), demonstrating its potential as a strategy to achieve collective goals in the innovation of local socio-technical systems towards more sustainable models.

These projects find their main economic support in public funding or private foundations due to the territorial scale of their intervention and the wide variety of social needs they tackle (such as mobility, food, health or education). Another important feature is their long-term perspective, with research programmes lasting from three to ten years.

1.2 DESIGN ROLE

This paper describes the direction taken by Participatory Design in recent years and presents some reflections on the on-going European project Life 2.0. The on-field experience of this project is then discussed from the Service Design perspective, drawing on the lessons learnt in terms of the management of the innovative results generated. Before presenting the problematic area and discussing the case, the role of Design in these contexts is outlined on the basis of the three main project features: (1.) the **territorial scale** of intervention, (2.) the **participatory approach** adopted by design and (3.) the **absence of predefined owners** of the final services developed.

(1.) For designers to develop services in response to emerging social issues (from the growing number of elderly to the lack of access to locally grown produce), they must firstly move on-field and get to know the territory, the people and resources they have to work with. From this initial exploration and through a set of workshop activities with potential stakeholders, service providers, clients and local associations and experts, designers are able to play a fundamental role in shaping the project scenario. The main purpose of this is to visualize the desired results to be achieved on the territory and to share them with the project partners in order to establish a common direction to be followed during the project development (Cantù, Simeone, 2011).

(2.) Scenario building is of great importance because it is the first step in aligning the stakeholders' interests. As the project evolves, partnerships between local actors take shape and collaboration grows around common interests according to the emerging opportunities (Ehn, 2008). From a service design perspective this means supporting the creation of new relationships and local networks of resources and people with the aim of implementing innovative solutions. In order to do that design takes the leadership of a participatory process where the aim is to involve all the people potentially interested in an open process and guide them towards the design of services answering local needs.

(3.) There has recently been a growing interest from the public sector - municipalities, national development agencies, private foundations and the European Commission - in funding research projects dealing with social innovation in urban and periurban areas, with the aim of fostering local sustainable development, improving local services and, in general, the quality of life of their dwellers. Indeed research projects working on welfare or seeking an answer to social needs tend to have the public sector as their main client. This implies that the form of the solution is usually not defined in advance but is designed according to the local resources available and the opportunities that emerge. From the initial ideas generated some prototypes are then tested in a protected environment, with selected users and economically supported by public funding (Ceschin, 2012). This means that in the first phases of service development it is not mandatory to involve the person, association or company that will offer them when the project finishes and that the detailed business model can be developed at a later stage. This is possible because designers or other project partners leading the process can play the role of the owner for a certain lapse of time. On one hand this condition allows the project to remain open for innovation, without constraints

deriving from business-oriented clients, but on the other hand it generates difficulties in the creation of self-sustainable services in the real market, where a stakeholder investing in and managing the solution is needed.

As previously mentioned, design assumes a leading role in these projects, triggering and aligning a series of small-scale initiatives and stakeholders. *Leading* corresponds to a series of design activities oriented towards conducting or facilitating the overall project. Often the leadership is set up in the original agreements and partnerships at the beginning of the programme and is often negotiated with the needs and aims of funding and partner institutions. In some case studies designers lead the initiatives practically, engaging various stakeholders in the programme (e.g. Feeding Milan, www.nutriremilano.it). In other contexts, design acts more as an overall approach to change, known as *design thinking* (Brown, 2009; Cross, 2011), that gives direction to the process using peculiar tools and methodologies. More specifically, design activities can play a significant leading role when helping to shape a long-term, guiding vision for individual projects. This role in building a shared vision and taking collective decisions is very important, but at a certain point a strategy to transform the project in an autonomous solution is needed. The services generated have to be able to sustain themselves and scale the solutions up to produce a real change in the area. These innovative solutions require new leadership in order to run in the market, where this role should be covered by someone with the necessary skills, competence and interest in managing them in the foreseeable future.

It emerged that once the funding scheme and designer support is withdrawn from design practice in participatory processes, the main obstacle to making the new service systems effective is lack of ownership and commitment. In fact, having many stakeholders involved in the decisional process does not mean that one of them will assume leadership at the proper time. This paper thus goes on to review the state of the art in Participatory Design and present an on-going European project, conducted within the DIS-Design and Innovation for Sustainability research unit in the Politecnico di Milano. This will be discussed in relation to the question of ownership and possible exit strategies for designers in these projects, drawing on some of the lessons learnt. Finally, the paper concludes by framing a possible strategy to overcome such problems.

2. A NEW WAVE IN PARTICIPATORY DESIGN

Participatory Design (PD) represents a field of design with a long tradition and evolution (Rizzo, 2010). Historically, the attempt to bring end users and stakeholders into the design process has long been the core objective of PD (Ehn and Sjogren, 1991) as well as of User-Centred Design. In different domains of application and for different aims, both design approaches have integrated user research and testing techniques in design processes basically to pursue the idea of “good design”. This means making products and services that really and effectively support people in their activities (from learning to playing, from cooking to working, from travelling to wellbeing). During the last 40 years many researchers on the field have been experimenting within the PD framework. Their work has led to the emergence of new concepts and tools: the idea of user experience (Forlizzi and Ford, 2000), which designers have to design with new designing tools (like cultural probes and storytelling); and the idea of co-designing to help people or communities to express their experience firsthand in the design process (Gaver et al., 1999; Vaajakallio and Mattelmäki, 2007). From a more fundamental human-centred design point of view, the main challenge of co-design is to enable users’ innovation potential. Even though users are contributing in a variety of ways, they almost exclusively respond to designers’ proposals visualised in probes and tools projected to stimulate and support people “making dimension” (Sanders, 2006). Users may contribute to solution generation, for instance, by participating in prototyping, storytelling or scenarios building (Vaajakallio and Mattelmki, 2007). Co-design in the PD framework helps designers to generate ideas by providing insights and in elaborating design problems in a way that

is most natural to them, i.e., through the visualisation language; in this case co-design can be seen as a learning and communicating platform.

Today Participatory Design is living a radical transformation since it is re-orienting its role, aims and tools: when it is called to deal with complex problems that have a territorial dimension, it requires complex systems of services and a radical transformation of all the relations that go to make up the contexts where they take the stage.

From products ready to be produced and consumed within the framework of the current socio-technical systems, to new solutions that require open and advanced design processes in order to conceive systematic changes (which in turn need radical transformations), design is standing for a new role that corresponds to a series of design activities oriented towards taking the leadership of innovative design initiatives by boosting, conducting, mediating, aligning and facilitating the foundation of territorial centred transformational projects (Manzini, Rizzo, 2011).

In these cases, design and designers in effect lead the initiatives by: individualising project opportunities, elaborating ideas and visions, looking for funds and engaging various stakeholders. They steer the overall approach (design thinking) to design the project vision, which they go on to manage and develop. They then design and manage self-standing proposals to implement a framework for change.

Manzini and Rizzo (2011) have largely described transformation projects where design takes the role of project promoter and mediator of the stakeholder network that enables it. We can take as an example of this “Feeding Milan. Energies for Change”, a project run by the DIS research group in the Politecnico di Milano-INDACO department. The project arose from the observation that in the Milanese urban area the demand for high quality, fresh food hugely exceeds the actual, available production, despite the presence of a large, potential “urban larder” known as Agricultural Park South Milan. The aim of the project is to design a system of services and infrastructures to develop a more efficient and effective Milanese agri-food chain, in order to shape a scenario of sustainable and innovative metro-agriculture (Simeone, Cantù, 2011). Its contribution to Strategic Design is twofold: on one hand it focuses the capability of the team of designer-researchers on building up the conditions for the project (design leadership); on the other hand designers work as mediators and facilitators to foster multifunctional services and collaboration among producers, to achieve economies of scope and co-design the entire system.

The emergence of a design leadership in solving these types of complex problems shows that there is a growing awareness among designers of the value of design as booster of innovation and change through participation. There is a radical shift away from the traditional view where the object of design is a well-defined product or service and where potential participants (quite separate from professional designers) are equally well-defined end users. The new object of design is, in fact, the realization of a “socio material assembly” where end users become co-designers. This is defined by Ehn (2008), using Bruno Latour’s word, a *Thing*: an ancient Anglo Saxon term indicating a “collective of humans and non-humans”, that is generated “in open public spaces rather than within an organisation” (Bjorgvinsson, Ehn, Hillgren, 2009).

The leadership approach adopted here by design does not diverge from that of mediator and facilitator since it draws on the idea that leadership should create the vision and the strategy to be applied to achieve it. As Kotter (1996) states “leadership defines what the future should look like, aligns people with that vision, and inspires them to make it happen despite obstacles”. Here, taking the leadership is a complex process of enabling participation around a vision and building up the conditions to make a project possible.

Projects where design takes the leadership pose a question about the role of design and its professional community (Thackara, 2005; Brown, Wyatt, 2010): the issue being that design seems to be competing with other competences, approaches and strategies able to lead and become owner of the new project. Designers and design researchers are using their professional knowledge to empower these co-design processes, bringing new ideas, orienting the resulting

initiatives and conceiving a new generation of enabling solutions (Bruns, Cottam, Vanstone, Winhall, 2006; Manzini, 2009) for which they cannot act as owner.

3. THE EXPERIENCE OF THE EUROPEAN PROJECT LIFE 2.0

This paragraph is organised in two parts: a description of the Life 2.0 case study as it has developed over the past year and a half and a presentation of the lessons learnt from design practice.

3.1 THE PROJECT

The European research project “Life 2.0” aims to improve social relationships for the elderly and their access to locally based service provisions.. Specifically, it works on the development of geographically positioned services to support independent living and social interaction for people in the 65+ age group. The objective is to foster a change in the way elderly people interact in urban space, starting from coordinated small-scale experiments and then scaling the solutions up. The project is being carried out in Italy by the Politecnico di Milano, INDACO dept. with Fondazione Housing Sociale and the Meglio Milano association and has partners developing parallel pilots in Denmark, Finland and Spain. It started in November 2010 and is planned to last 3 years. During the first half of the programme the partners focused on acquiring a profound understanding of the context, through desk and ethnographic research, and on the development of service scenarios and a first draft of their business models. In the second part the goal is to create service prototypes, to test and co-design the platform with the users and the other actors potentially interested in the solution, and then to deliver the final service ready to be launched in the market.

In the project Design works in partnership with stakeholders from the public and third sector and end users, taking the leadership firstly by developing scenarios, meaning the definition and visualization of the services the project will work on, and then by aligning the needs and interests of all the actors in a Participatory Design process. Recently the testing phase has started to include a group of 20 pilot users and 3 local organizations in co-design activities. Designers managed meetings and workshops to enable people to co-design the platform and to provide their feedback and insights on the first prototypes. Discussion on the project is carried out, both with single stakeholders and groups, using tools such as face to face interviews, questionnaires, experience prototypes on digital platforms and group activities and simulations. These enhance the exchange of opinions and perspectives between the project stakeholders on the possible functionalities and services to be offered on the LIFE 2.0 digital platform.

Currently the partners of the consortium are facing the challenge of defining detailed business cases and the need to include the future owner of the platform in the following steps. The need is now emerging to frame the options for transforming an innovation obtained through the participation of many stakeholders into a working and self-sustained solution.

So far in prototyping the services and testing them we have achieved results in terms of the design of the platform structure and the Graphical User Interface. At the same time, in June 2011, we started to design the business model for the platform, under the leadership of the technical partners. In this process designers worked jointly with the technical partners by managing workshops activities and implementing co-design sessions with the project partners. The outcome was the definition of the business models (BM) supporting the basic functioning of the system.

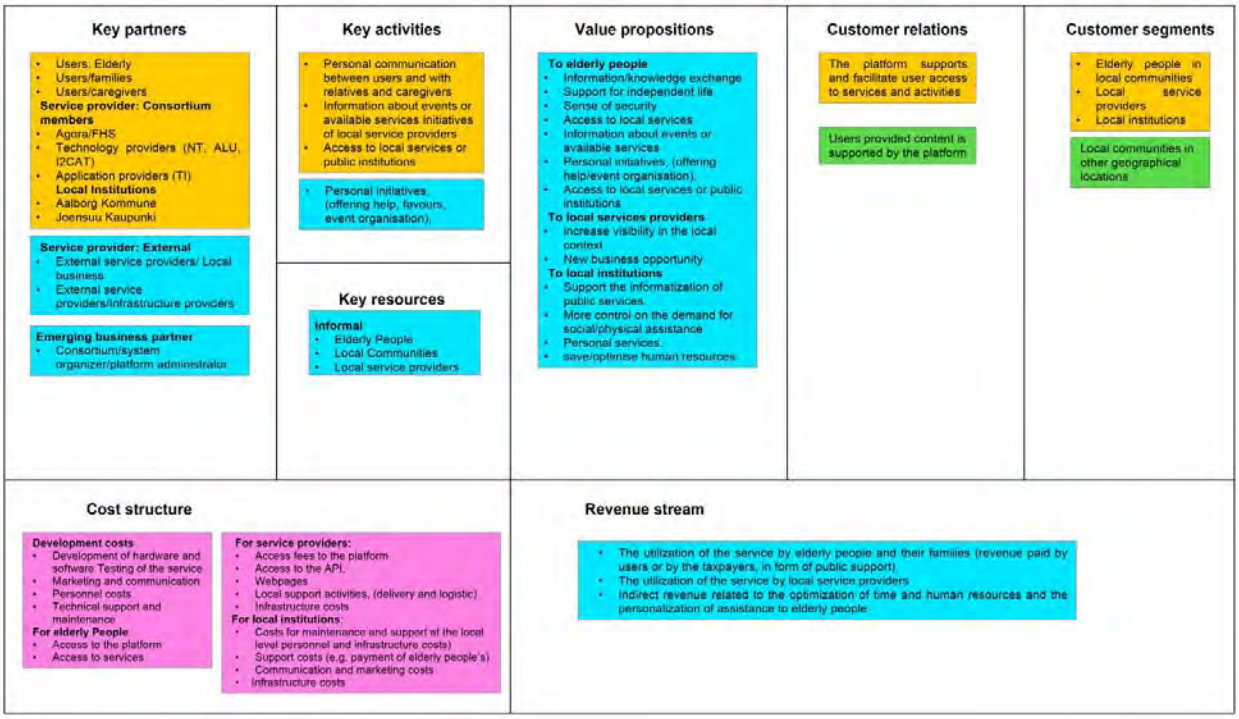

Figure 1 First draft of the Life 2.0 business model canvas generated by the European project partners.

This first result comes from an analysis of the local contexts (in all the pilot countries) but without taking into consideration the possible owners of the Life 2.0 digital platform. Thus the service concept was particularly suited to the users but did not deal properly with the back-office side. The main consequence of this was the inclusion of generic owners in the BM, without furthering options for its implementation in real contexts.

The definition of who will actually deliver the services emerged as a basic need later in the process, in March 2012, during the prototyping and testing phase with the elderly people. This observation emerged as a request from users, because they needed to understand how to establish relationships among themselves and with the service provider in order to build trust in the growing community on the platform. A workshop with possible owners from the public and third sector was organised specifically to discuss this issue in May 2012. This activity made the local partners aware of the Design process, which can be summarized in the following points:

- It is important to investigate the ownership options carefully before starting the testing phase with the users. This is in fact a fundamental element in building trust in the community of participants and to understand what kind of services could be implemented and what kind of relations the users could establish;
- The first draft of the BM can be used as a tool to dialogue with the local stakeholders in order to face the ownership issue in a more participatory way. In this way the user experience (front-office) could be designed at the same time as the management side (back-office), avoiding discrepancies in their development.

At the moment, the technical partners are working out new BMs on the basis of the last workshop results but the separation between expert and end-user activities in designing the BM might generate further tendencies.

The project has raised considerable consensus in several meetings, including third sector organizations, and its success potentialities are growing. But on the other hand the actors currently included in the process have too few internal resources to take charge and manage the overall system by themselves, so in order to really start introducing new services on the same platform,

the ownership question come out as the main constraint. These actors (third sector organizations) in the system can be part of the service as users but a larger and more significant stakeholder, linking the project to the real market, would appear to be more appropriate for generating self-sustainable solutions.

At the moment the project is in a phase where the final objective is clear and the business model is almost defined, but the solution must be bridged in the market by designing the path from service definition to its implementation. The hypothesis to deal with the leadership issue and possible future development of the solution generated is to use tools such as business cases, and the results they have achieved so far through small and full-scale experiments, in order to find possible alignments with new actors.

3.2 LESSONS LEARNT

Today different design initiatives are taking the stage and design is standing as promoter of initiatives where it is difficult to distinguish between the role of designers as professionals, applying their competence and knowledge to find possible solutions to a specific problem, and their role as owners of the solutions in the first phase of their development on the market side. From experience acquired in the Life 2.0 project, as well as in other projects the DIS research group in INDACO dept. is currently involved in, it is possible to highlight some tendencies in the design action that can be turned into lessons learnt and indications for future initiatives like those described here.

- *Balancing operational and economical sustainability*

Stakeholders are not only end users and partners who can guarantee the feasibility of the project from the point of view of front-office interactions. They are also investors and players on the market side who may have an interest in becoming the owners of the project. For these types of projects facilitating the alignment of a stakeholder around a design-led vision should not only help people, both stakeholders and users, to express their opinion and to include their vision in the project as requirements and/or project drivers, but should also help to “sell” the solution to an owner. In the set of projects here analysed, *facilitating* regards design activities that in different ways encourage diverse stakeholders (such as citizens, NGOs and so on) to get involved in the project, with different aims depending on their role in the initial phases of project development. Thus, in this framework, *facilitating* has to do with stakeholders’ participation in the development of the project vision and overall scenario (what the project will look like at its end), but should also be extended to include scenarios for the economic sustainability of the envisioned solution (i.e. business models) right from the beginning.

- *Designing exit strategies for the design team*

In the spirit of this new wave, Participatory Design practices become a continuous process of organising and implementing design initiatives aimed at the construction of new socio-technical systems (the new “material assemblies” in the words of Pelle Ehn). In this framework, the design team is completely absorbed, often playing the role of different stakeholders, simulating the components of the process and their behaviours. Under these circumstances designers activate, manage and maintain the process of continuous engagement and make a network of local actors concrete and tangible (*things* have to happen), but at the same time, designers often end up playing the role of one of the components of the socio-technical system under construction. This in turn poses two problems: the first one is that if designers are a fundamental part of the system under construction it will be really difficult for them to leave the project and to have it functioning without them. The second problem is about the role of designers as researchers: how they will able to judge the results of their experimentations if they become a fundamental part of their functioning?

With the word *designers* the authors refer not only to practicing designers in business and consulting, but also to a growing number of design researchers who operate in research-intensive activities, and apply their design competence there. In these cases what seems to be important is

the outline of a design exit strategy that would allow the design team to leave the prototype of their project to stand on its own feet, after identifying the conditions for its economical and functional sustainability (i.e. a replicable solution and a robust business model) and laying the foundations on which to build them up.

- *Designers' role*

There have been plenty of signs that designers' roles are in constant transformation. The leadership or the control of the design process no longer necessarily rests in the hands of the designers. Cottam and Leadbeater (2004) propose that the role of professional designer "becomes one of a coordinator, developer and provider of co-creation tools". To lead change, designers have to positively accept that they can no longer aspire to a monopoly on design. However, this does not mean that designers need to be in the back stage. On the contrary, taking the leadership of the change means recognising a new role for designers in society. Exactly because the whole of contemporary society can be described as a mesh of designing networks, and because the complexity of the problems require a strong commitment by all of the stakeholders that share them, designers have the growing responsibility of actively participating by: 1) feeding them with their specific competences (design knowledge: design skills, capabilities and sensitivities that partly come from their traditional culture and experience, are partly totally new); but also 2) offering their visions on how to align all of the resources to individualise trajectories of changes (design thinking).

The first point can be achieved by the prototyping mode that addresses in particular the ways in which designers tend to reflect and make sense of complicated and often yet non-existing things by giving shape, sketching, visualizing and prototyping in various ways. This reflective practice, as described famously by Schön (1983) is an exploratory activity in which seeking and finding problems and their solutions are strongly intertwined.

The second point is more related to the dialogue mode, and deals with the processes of collaborative design and tools for engaging users and other stakeholders in collective creative envisioning. This mode, deriving from co-design, has its roots in the development of industrial and interaction design as well as 'beyond usability' research dealing with experience design and empathy (Mattelmäki & Sleeswijk, Wisser 2011; Rizzo, 2010). Given that this applies also to the project leadership, designers need a better understanding of how to develop and support stakeholders to become leaders of the project as a fundamental part of their activities.

- *Designing tools for the definition of a participatory BM*

In order to do that a possible direction to be followed is to develop appropriate tools to activate the back-office and the business model supporting the solution at the same time as designing the front end of the service and the user experience. This is not usually part of the participatory design objective. In fact the business model is traditionally a part of the service design that is defined in closed circles of experts and technicians without involving the future users and providers of the solution. The assumption is to use the first draft of BM as a tool to discuss from the beginning not only with the project partners, but also with end-users and other local actors potentially interested in the solution, in order to keep updating the model to the changing of the overall service offering. The strategy of being open for participation on the management side of the service aims at the same time to foster a stronger commitment in the participants to the project results.

4. CONCLUSIONS

At the beginning of the paper we described a new type of project in which designers are active today. We defined these projects as experimentations of complex participatory processes through which designers are trying to deal with the problem of how to innovate at territorial scale by engaging citizens, public and private institutions.

We identified a new role for designers as leaders who promote the project idea and act in order to establish, found and manage it. We also discussed the main problem for these projects: that of their ownership beyond the designers' role.

Managing innovation by leading complex participative projects is a promising approach for solving complex problems that exist in territorial areas where citizens and a large range of stakeholders operate and express their interests and needs. However, design experimentation is not sufficient to make these innovations stable and robust enough to become offerings on the market side. We need to find ways and modalities to start designing the correspondent business model of these solutions right from the beginning, and to experiment with it as an open prototype that evolves in a dialogue among the players committed in the project.

This would help to identify the most promising project ownership and to increase its commitment in an experimental, participative and open process.

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Peter Ford and James Woudhuysen (2012). *The fuzzy front end of product design projects: how universities can manage knowledge transfer and creation.*

THE FUZZY FRONT END OF PRODUCT DESIGN PROJECTS: HOW UNIVERSITIES CAN MANAGE KNOWLEDGE TRANSFER AND CREATION

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Over 20 years, the Design Unit at De Montfort University, Leicester, has undertaken research projects for both large firms and small or medium-sized enterprises. Many projects have been fully funded by private sector clients; but in those projects assisted by public funds, the Unit's research has brought together manufacturers, sub-contractors, design consultancies, market researchers, intellectual property specialists, funding bodies and other higher education institutions. Using these experiences, the paper focuses on the dynamics of knowledge acquisition during the 'fuzzy front end' of product design projects. We suggest that, through a novel management and integration of different players in new product development, higher education institutions can help small firms, in particular, get existing knowledge transferred to them, develop new knowledge, lower uncertainty through prototypes, and so make the most of design.

Keywords: Innovation; uncertainty; prototypes

METHODOLOGY

The paper first reviews some of the literature that relates to knowledge transfer and the process of design in the early stages of new product development (NPD). It then considers the Design Unit's experience, since 1992, in design-based innovation in manufacturing in the UK's East Midlands region. The experience covers both commissions that were fully funded by private sector clients, and commissions that were partly or wholly funded by three schemes of state support for design. The paper analyses data from this work, and contrasts two projects funded by international companies with two state-supported projects for local firms. The paper concludes by proposing scenarios for the management and integration of knowledge around NPD.

LITERATURE REVIEW

KNOWLEDGE AND ITS TRANSFER

The impact of knowledge on general economic life first gained systematic recognition 50 years ago (Machlup, 1962). In the same era, too, there emerged an emphasis on the *communication* of ideas in society, rather than on their production (McLuhan, 1962; Fiore & McLuhan, 1967). In management literature, however, the subtleties of both the transfer of knowledge and its creation were captured in a much later landmark book, *The Knowledge-Creating Company* (Nonaka & Takeuchi, 1995). That book remains relevant today. One reason: more recent studies of product design in UK government-funded Knowledge Transfer Partnerships (KTPs), while useful about its

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commercial benefits, don't always clearly define the nature of the knowledge transfers (Ford & Davies, 2012).

For Nonaka and Takeuchi there are two kinds of knowledge: informal, subjective, intuitive and *tacit* knowledge held by individuals, and formal, *explicit* knowledge. For them, knowledge is primarily tacit, consisting of technical knowhow at the fingertips of professionals, as well as mental schemata, beliefs, ideals, values and emotions. However, when tacit knowledge is converted into the explicit sort, and vice versa, firms can, through such a 'knowledge spiral', acquire 'organizational' knowledge.

What circumstances prompt the kinds of knowledge conversion outlined by Nonaka and Takeuchi? Several authors contend that information from *sources outside the firm* is critical to innovation (Drucker, 1999; Van den Bosch, Volberda, & De Boer, 1999; Reid & de Brentani, 2004). Others too have seen real possibilities in the tension between academic and corporate environments (Rynes, Bertunek, & Daft, 2001), and in the general interplay between these two milieux (Schaber & Thomas, 2008).

After Nonaka and Takeuchi published, the rise of the Internet gave new weight not so much to the creation of knowledge as to its communication. While the concept of the network society gained a mass audience (Castells, 1996), management literature veered toward the need for 'open' innovation, both in products and in services (Chesbrough, 2003, 2011). In this framework, large, vertically integrated firms manage information in a comforting 'landscape of abundant knowledge' (Chesbrough, 2003:XXV). Thus while Chesbrough concedes that innovation includes *knowledge generation*, he prefers to highlight *moving knowledge around* – getting it from customers, other companies, suppliers, universities, national laboratories, industrial consortia, consultants and start-up firms (Chesbrough, 2003:40, 52).

Clearly knowledge management is essential to product design, and designers need a 'know-what, know-who, know-why, and know-how' framework (Qiu, Chui, & Helander, 2006: 52). However, rather than just the diffusion of information, *intense interaction between both information sender and information receiver has to take place over time* if a true transfer of knowledge is to occur, (Thompson, Jensen & DeTienne, 2009:331,333). Also, true transfer can only take place if the knowledge acquired is *acted upon*, so that it creates *new* knowledge and is assimilated as experience. Open innovation, termed by its boosters as an 'established and mainstream engine of economic growth' (Harwood & Simoes-Brown, 2012:143), tends to downplay this creation of new knowledge and therefore, if anything, tends to impede growth (Woudhuysen, 2010).

THE 'FUZZY FRONT END' OF NPD PROJECTS

The question of creating new knowledge, and even of acquiring knowledge that already exists, assumes particular force at the inception of an NPD exercise. Here, different participants encounter what has become known as the 'fuzzy front end' (FFE) of such exercises – circumstances that ensure that not all the knowledge necessary for any particular project is yet available to those working on it. Here, it's worth looking at the work done on the car industry by Kim Clark and Takahiro Fujimoto (Clark & Fujimoto, 1990, 1991).

In their original article, Clark and Fujimoto (1990) made names for themselves around the ideas of 'product integrity' and the 'heavyweight product manager'. 'Internal' product integrity in cars meant 'consistency between a product's function and its structure: the parts fit smoothly, the components match and work well together, the layout maximizes the available space' (Clark & Fujimoto, 1990:108). 'External' product integrity, by contrast, meant 'integrating a clear sense of customer expectations into the work of the product development organization as a whole' (Clark & Fujimoto, 1990:108). The work of leading both kinds of integrity fell to heavyweight product managers, automotive engineers who first were 'deeply involved in creating a strong product concept', and then, as the concept's 'guardians', were out to 'keep the concept alive and infuse it into every aspect of the new product's design' (Clark & Fujimoto, 1990:114). In this first excursion,

it should be noted, Clark and Fujimoto made several references to the importance of *prototypes* in *early-stage* NPD. For example, they wrote:

> *Production people built high-quality prototypes that tested the design against the realities of commercial production early in the game and so eliminated expensive delays and rework later on.* (Clark & Fujimoto, 1990:119)

By contrast, Clark and Fujimoto made, at this moment, no reference to *uncertainty* in NPD.

By the time of their book, however, Clark and Fujimoto (1991) made several – though only several – mentions of uncertainty in early-stage NPD. Their emphasis remained on product integrity and skilled management. Interestingly, too, in both article and book, the authors emphasized how the heavyweight product manager had to ensure and personify effective communications, but laid much more stress on the person *pushing ideas forward*. The heavyweight had to go about 'developing an integrated product concept' (Clark & Fujimoto, 1990:110). Engaged in 'integrated problem solving', they were 'responsible not only for internal coordination, but also for product planning and concept development' (Clark & Fujimoto, 1991:128, 255).

In the same year that Clark and Fujimoto's book was published, two other authors popularized the FFE (Smith & Reinertsen, 1991). Interestingly enough, their book argued that the FFE is 'an area of extraordinary opportunity' (Smith & Reinertsen, 1991:50). The period between recognition of an opportunity and the moment at which a full development team starts working on it can often be 'roughly half the time to market' (Smith & Reinertsen, 1991:50). In turn, buying time in that period is very much cheaper than doing the same later. Altogether, Smith and Reinertsen concluded,

> *The true cost of the Fuzzy Front End is much higher than managers suspect. The most important component of its cost is the cost of delay, not the cost of the people assigned to the project.* (Smith & Reinertsen, 1991:53)

However, reflecting the broader, cultural zeitgeist of uncertainty about the future that came into its own after the end of the Cold War, the literature of innovation and NPD soon lost Smith and Reinertsen's 'can-do' attitude. Indeed, it went on to make a big issue of the unknown. In 1992, a group of four authors from northern Europe and the US wrote up a study of communication between R&D and marketing departments at the FFE: when published in full in 1995, it contained no fewer than 96 mentions of the string 'uncertain' (Moenaert, De Meyer, Souder & Deschoolmeester, 1995). Defining uncertainty as the *gap between required and possessed information about user needs, technology, competition, and the required resources*, the study proclaimed that '[I]nnovation patterns can be viewed as uncertainty reduction activities, as is shown by the vast majority of scholars in the field' (Moenaert et al, 1995:244).

Again in 1995, Nathan Rosenberg, one of America's leading experts on innovation, made a similar point. He wrote:

> *Uncertainty pervades not only basic research, where it is generally recognized, but also product design and new product development. This means that any early commitment to a specific large-scale project [in innovation] – as opposed to a more limited, exploratory approach, is likely to be risky.* (Rosenberg, 1995)

What Rosenberg wrote was not new, so much as a formal setting out of the idea that innovation – especially in large products – is an activity saturated with risk. Indeed, since 1986 and the first publication, in German, of Ulrich Beck's *Risk society* (Beck, 1992) the doctrine has grown that innovation itself is a source of risk.

If the open innovation framework is complacently satisfied with the world's existing knowledge, those who highlight uncertainty seem plagued by doubts. But there are ways out of this dilemma. First, uncertainty can be a positive thing in a sense broader than that specified by Smith and Reinertsen: it can be a *spur to the creation, through action, of new knowledge*. Second, it is possible that uncertainty at the FFE may be greatest for 'discontinuous' as opposed to 'incremental' innovations (Reid & Brentani, 2004:172). However, *prototypes* – early, and perhaps rapid, or virtual – can lower uncertainty in the FFE, across both incremental and discontinuous innovations. The evidence comes from Japanese manufacturers, making largely industrial products around which customer requirements were well understood, but for whom prototypes therefore lowered uncertainties of a technical nature (Verworn, Herstatt, & Nagahira, 2008:12,13). Nevertheless, it is suggestive.

RESEARCH QUESTIONS

Is knowledge transfer bound up with the production of new knowledge, not just the communication of the existing sort?

Can a commercially experienced academic environment support innovation, in ways that design consultancies and government agencies cannot?

Is uncertainty at the FFE something to be relaxed about, particularly if prototypes are undertaken?

CONTEXT – THE DESIGN UNIT

The Design Unit established itself in 1992 in response to demand from local industry for a style of design research and innovation that could probably only be met by a University with broad expertise and resources in NPD. For more than 10 years, the Unit designed products ranging from consumer goods, through transport equipment, to retail fixtures and fittings. It did this both for international companies, and for small and medium enterprises (SMEs): in each case, commissions were fully funded by the client. It should be noted here that in Britain, the 2006 Companies Act defines SMEs as firms that have two of three characteristics – an annual turnover of less than £25m (nearly $40m), gross assets of less than £12.5m (nearly $20m), or fewer than 250 employees.

As the Unit gained a name for its collaborative outlook and effective designs, so most projects came about through recommendation and repeat business. In all, more than two thirds of the concepts developed by the Unit reached production, with more than 22 products or product ranges being successfully launched to market over the period 1992-2001. In a significant majority of cases, the Design Unit engaged in a high level of collaboration with a number of players, and so assisted in the transfer of important knowledge. But there was something else, too: in a number of cases, *the level of innovation achieved depended on the creation of new knowledge – and was reflected both in patents, and in the winning of public awards.*

A few years after the election of a Labour government in 1997, the Design Unit's direct work for private sector clients began to be complemented by projects that, in whole or in part, enjoyed the support of the state. With the Regional Development Agencies Act of 1998, the government established Regional Development Agencies (RDAs) throughout the UK. Part of each RDA's job was to support (SMEs). In 2003, therefore, the Design Unit suggested to Leicestershire Economic Partnership, a body backed by money from the East Midlands RDA, that it fund a pilot scheme – Improving Business by Design – aimed at SMEs in the Leicestershire sub-region of the East Midlands (Marsden and Ford, 2005). Thereafter, the Design Unit suggested another initiative, known as the Design Pilot Scheme, to the government's Manufacturing Advisory Service. Today, while the Unit continues with work that is fully funded by private sector clients, it also gains assistance from the European Union, in the shape of the third venture it has put forward: a

Regional SME Design Support Scheme, financed by the Union's European Regional Development Fund.

In fact, the Design Unit not only proposed but also managed and implemented each of these three schemes. That gave it the freedom to engage not just SMEs, but also manufacturers, sub-contractors, design consultancies, market researchers, intellectual property specialists, funding bodies and other higher education institutions (HEIs). From 2003 until today, these schemes have seen more than £750,000 (nearly $1.2m) invested in the local design community alone.

Below, we summarise the Design Unit's experience with commissions that were fully funded by private sector clients, and its experience with the three schemes that involved a degree of state support.

COMMISSIONS FULLY FUNDED BY PRIVATE SECTOR CLIENTS, AND THE THREE SCHEMES USING STATE FUNDS

COMMISSIONS FULLY FUNDED BY PRIVATE SECTOR CLIENTS, 1992-2002

The EU defines 'micro enterprises' as firms with a headcount of fewer than 10 employees, and a turnover of less than €2m (nearly $2.5m). Predictably, then, the vast majority of the Design Unit's commissions that were fully funded by private sector clients were for firms that were larger than micro enterprises. Often through project managers, clients supplied briefs and specification: in effect, they hired the Design Unit in the way they would a design consultancy, or consultants in design research and forecasting. Clients did bring other players into the work, but this happened only occasionally.

THE IMPROVING BUSINESS BY DESIGN SCHEME, 2003-7

This scheme began with research into those Leicestershire SMEs that might benefit from support in NPD. The Design Unit identified 52 possible projects among capable manufacturers that also had definite routes to market. Eventually, the Unit selected 16 projects for further development and funding support, and went on to write project briefs and product specifications, hire local design consultancies to act on these, and retain a role guiding design research and implementation through to production. As described earlier, money for this work originated with the East Midlands Development Agency. However, UK central government's Higher Education Innovation Fund, which helps HEIs spin out their ideas into industry, also chipped in cash. Meanwhile, clients invested their time in the design research and implementation stage; they also invested their own cash – but only once manufacturing development began.

Overall, the scheme was highly successful. More than 62 per cent of the Design Unit's interventions went through to manufacture. In central government, industry minister Lord Sainsbury commended the Improving Business by Design scheme for showing 'a 14:1 return on public sector investment through the development of new markets for UK design and manufacturing companies' (Sainsbury, 2005).

THE MANUFACTURING ADVISORY SERVICE'S DESIGN PILOT SCHEME, 2008-10

The Manufacturing Advisory Service operates across the UK, but has no specific mandate to support design. In 2008, central government was encouraging RDAs to adopt Designing Demand (Design Council), a state run scheme. However, the East Midlands RDA wanted to consider options, and invited the Design Unit to propose how it would support local SMEs through the MAS network.

Following a number of sub-regional events, the Design Unit selected 13 projects among capable manufacturers that also had definite routes to market. The Design Pilot Scheme that emerged around these projects followed Improving Business by Design, in that clients had to fund manufacturing development; but it differed from the earlier scheme in three respects. First, funding for the design stage of each project was here split 50:50 between the Advisory Service and the

client companies second, the Unit not only hired design consultants, as before, but did design research and implementation alongside them, while retaining its role in supervising each project through to production. Third, the East Midlands RDA played a role on top of basic funding for design. To local food, drink, medical, transport and construction companies, the RDA's freshly established Innovation Networks made outlays to help in the analysis of markets, the protection of intellectual property and the assembly of prototypes. That, and the way in which the Networks referred clients to the Design Unit, proved an invaluable counterpoint to its Design Pilot Scheme.

Results were remarkable. In all, 11 of the 13 projects undertaken reached production.

THE REGIONAL SME DESIGN SUPPORT SCHEME OF THE EUROPEAN REGIONAL DEVELOPMENT FUND, 2009-12

Since 2000, England has benefited from more than €5bn of monies from the EU's European Regional Development Fund. Here the Design Unit did not seek out client companies; rather, funds were available to any SME applying for innovation support – including manufacturers spun out from East Midlands universities other than De Montfort. In this case, all the cash for design work came from Brussels, as well as from the UK central government's Higher Education Innovation Fund. As with the Design Pilot Scheme, however, the Innovation Networks run by the East Midlands RDA assisted, and both design consultants and the Design Unit collaborated on the design work. Manufacturing development was, as in the previous two schemes, left for clients to fund.

The Design Support Scheme has turned out to be very popular. Under it, the Design Unit has taken on nearly 100 assignments to date. Strikingly, while about seven in every 10 companies employed just five or fewer staff, more than five in every 10 has so far neared or reached production.

QUANTITATIVE ANALYSIS OF THE DESIGN UNIT'S WORK

The four figures below quantify the performance characteristics of the 181 design research and implementation projects so far undertaken by the Design Unit. Here, the category 'successful completions' refers to projects that have progressed or are progressing to manufacture, while 'unsuccessful completions' are projects that have not progressed or will not progress to manufacture. In our definition, small enterprises have fewer than 10 employees; medium enterprises form a rather broad category, having between 11 to 250 employees, and large enterprises are organisations with more than 250 employees.

Importantly, 'external Management & Integration' (M&I) refers to those projects in which the Design Unit coordinated the work of a number of players: manufacturers, sub-contractors, design consultancies, market researchers, intellectual property specialists, funding bodies and other higher education institutions.

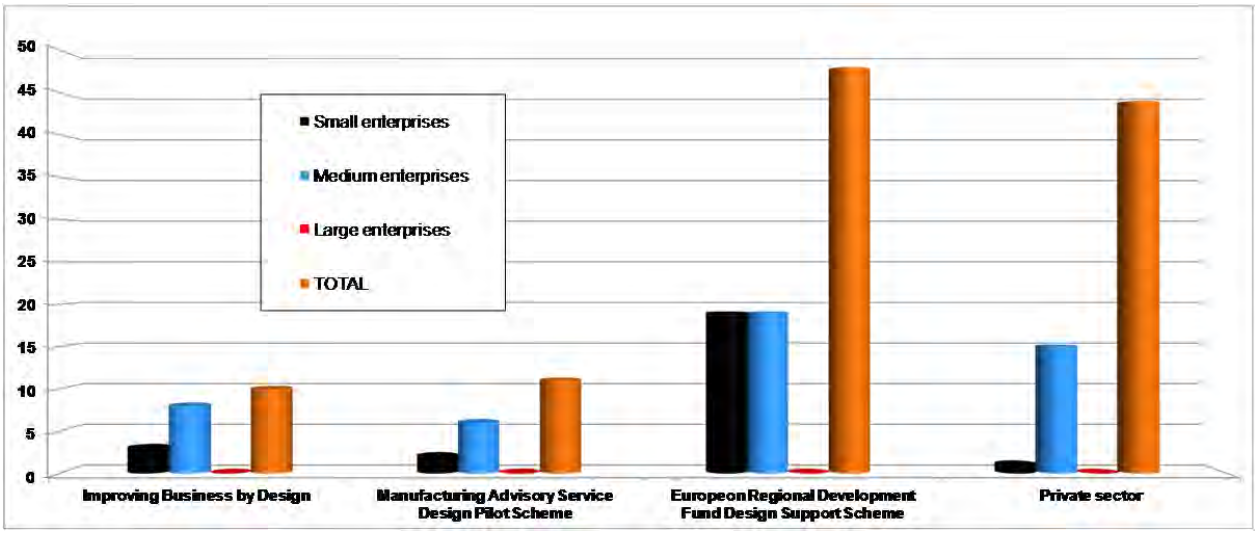

Figure 1 Number of SUCCESSFUL completions conducted WITH external Management & Integration

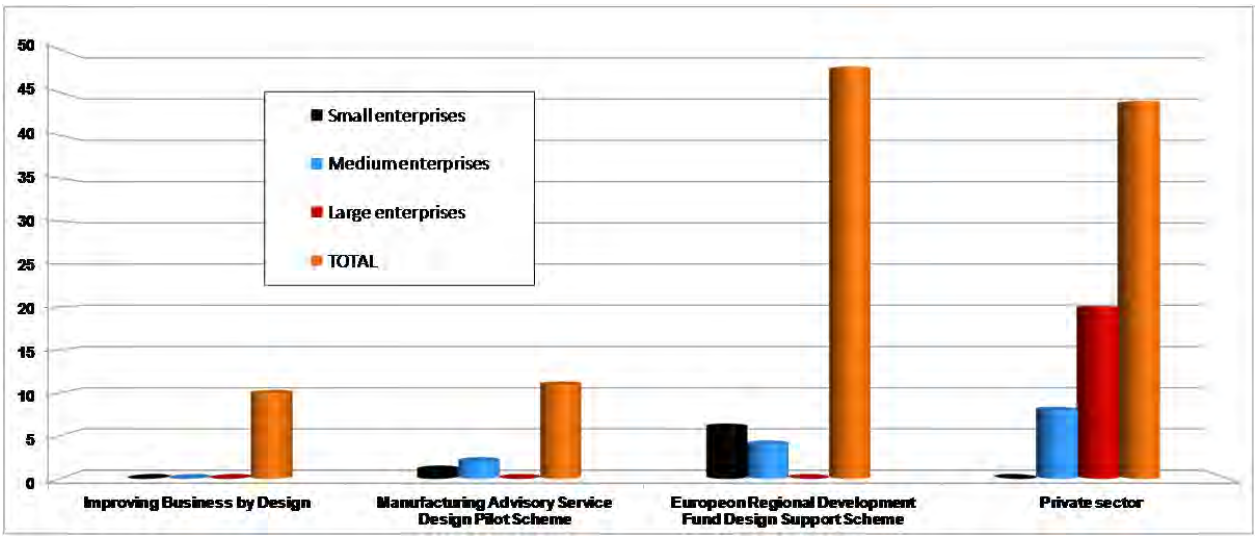

Figure 2 Number of SUCCESSFUL completions conducted WITHOUT external Management & Integration

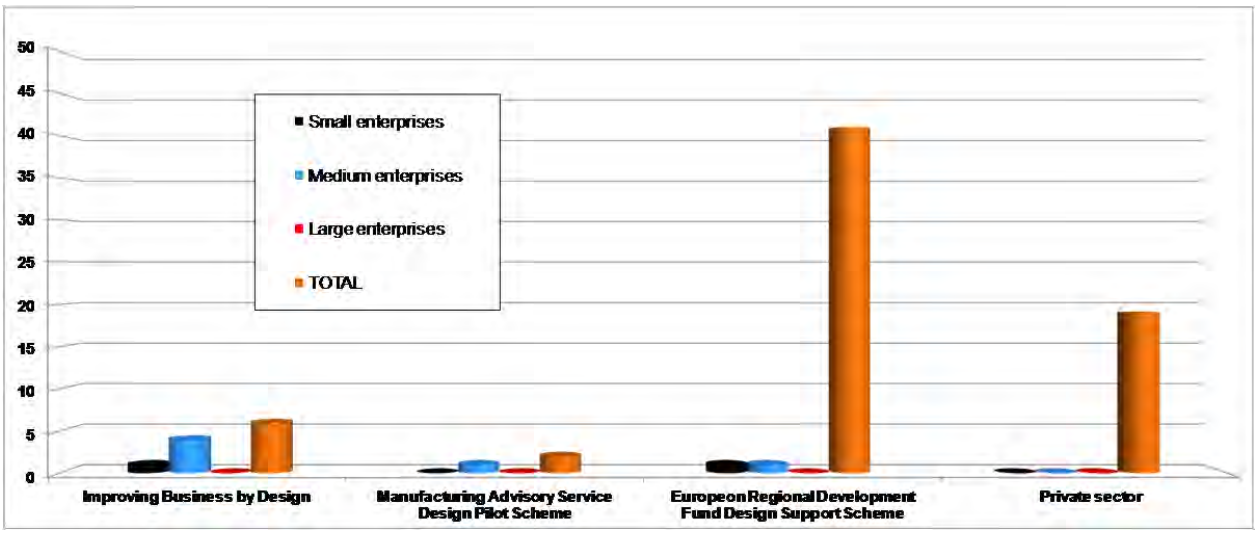

Figure 3 Number of UNSUCCESSFUL completions conducted WITH external Management & Integration

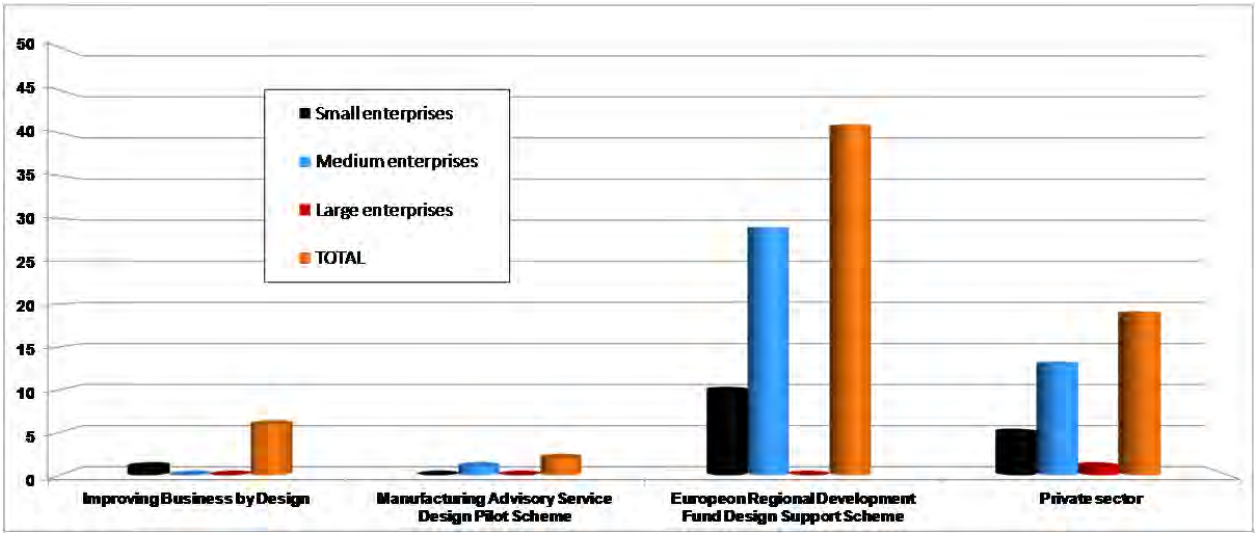

Figure 4 Number of UNSUCCESSFUL completions conducted WITHOUT external Management & Integration

Overall, the Design Unit successfully completed nearly two in every three projects. Among small and medium enterprises, there was a strong correlation between successful completions and external M&I: nearly four in every five of such projects met with success. Conversely, where small and medium enterprises enjoyed no external M&I, nearly nine out of 10 projects failed to complete successfully.

Large enterprises fared differently. With them, very few projects failed to complete – whether they were conducted with external M&I, or without it. Clearly, and not unexpectedly, it was small and medium enterprises that drew the most tangible benefits from external M&I.

We now examine four case studies of the Design Unit's work in the light of our quantitative analysis.

FOUR CASE STUDIES OF THE DESIGN UNIT'S APPROACH

The case studies below span small, medium and large enterprises. Two were fully funded by private sector research contracts; two relate to the publicly funded schemes we have discussed. All four bring out the way in which, if information acquired is acted upon and worked up in the form of prototypes, new knowledge is created.

CASE STUDY 1 – COMPANY SE, MAKERS OF HAND-HELD SCIENTIFIC EQUIPMENT

SE, a large producer of scientific equipment, runs manufacturing centres in the UK, the US and Scandinavia. Among other products, it makes hand-held devices that determine the composition of a variety of metals. In this product domain, SE's existing model had the reputation of being difficult and costly to manufacture, as well as unreliable to use: as a result, the product was losing market share. The Design Unit's job was to develop a replacement product that avoided these problems, boasted equivalent or higher functionality, and was more comfortable to use. The new product also had to display a whole number of warnings about use to those who handled it, in accordance with ever-tightening regulations. Above all, the new product had to be developed quickly to stem loss of market share. Indeed, the division of SE responsible for the new product knew that its future rested on the outcome of a development programme that, in all, cost £2m (more than $3m).

A key feature of the new design concerned how to manage the dissipation of heat from the product's internal components. The original device had two small heat dissipation panels which, although adequate from a thermal perspective, were very hard to assemble, and very hard, too, to seal inside the product. Eventually, a major innovation was made: a single large extruded aluminium panel was substituted for the two panels. In fact this component came to comprise the

bulk of the upper part of the product: it proved to have structural and cosmetic merits, was comparatively easy to assemble, and avoided all the sealing issues of the previous design.

SE gave a dedicated manager responsibility for overall project management, and involved almost all the interested parties in initial concept development, so as to minimise uncertainties. At its conclusion, the project resulted in all the new product's commercial targets achieved and securing the future of the division in charge of it. However the product was late to market – something that inspires three observations.

OBSERVATION 1

While the old product was tricky to manufacture and seal, and had design details that were poorly resolved, it was at least in continuous manufacture. The new design was radically innovative in its configuration, but introducing it promised to disrupt production schedules quite dramatically. Nevertheless it was accepted, because it was 'not like the old model'. Given the disruption caused, there might have been wisdom in simply ironing out the worst features of the old model, and staying with the production routines that accompanied that. However, there was great prejudice against staying with the status quo in any way.

We find this turn of events absorbing. After all, irrational *management prejudice* never figures in the literature on the FFE in NPD.

OBSERVATION 2

A full two months after a first prototype of the new model was built, tests by SE found that the large new single panel within it didn't dissipate heat as well as the two smaller panels in the original model. In this respect, the product lacked what, as we have seen, Clark and Fujimoto (1990:108) termed 'internal' product integrity. Then it emerged that a member of SE's technical team, who had worked on the original design, had suspected all along that heat dissipation would be weak, but had elected to stay silent. Fortunately, *rapid prototyping techniques provided new knowledge*, relatively quickly, about how best to amend the new design.

The two months testing and subsequent design iterations caused delay – and that, combined with other delays (in further design development, the procurement of parts and the commissioning of production tools) had a significant impact on the project's end-date. Altogether, the remarks made by Smith and Reinertsen (1991) about delays at the FFE were strongly confirmed. Still, the use of rapid manufacturing techniques reduced the effect of these delays, and allowed 80 vacuum-cast pre-production models to be sold to and tested by impatient customers. Eventually, fully finished, injection-moulded products succeeded these models.

The lesson here is that *while powerful knowledge may already exist within a development team*, *corporate 'politics' may prevent such tacit knowledge from becoming explicit*. Again, one doesn't encounter such a turn of events in the literature on the FFE, even if the categories 'tacit' and 'explicit', pioneered by Nonaka and Takeuchi (1995), are all too relevant here.

OBSERVATION 3

In their book, Clark and Fujimoto (1991:255) write that heavyweight product managers have broad 'responsibility and clout', that they are 'usually senior within the organization, often at the same or higher rank' as the heads of its functional units, that they 'exercise strong direct and indirect influence across all functions and activities in the project'. The SE person in charge had no authority like this. Indeed throughout the project, all SE employees involved, and especially the person in charge of it, proved excessively cautious. Covering their backs, they unnecessarily prolonged their evaluation of design details (the heat dissipation feature, for example), and so cramped the ability of the Design Unit to assist SE.

Overall, *company habits and a lightweight product manager impeded swift decision-making*. Thankfully, however, the sheer size and financial resources of SE ensured market success. Still, there can be no doubt that SE staff suffered from a *blame culture*, which in turn led to an

exaggerated and somewhat congenital *aversion to taking risks. Here uncertainty in the FFE was not a gap in information that needed to be closed, but a way of life.*

These facts, which are only too familiar, once again seem to elude the literature on the FFE.

CASE STUDY 2 – COMPANY SF, MAKERS OF LIGHTWEIGHT SPORTS FOOTWEAR

SF forms a part of a large multinational brand-orientated group, which is highly regarded for its design and manufacture of quality outdoor leisure products. At the time of the Design Unit's involvement with SF, it was encountering rivals who were growing in confidence – while its own product range was in danger of becoming dated. Following an aggressive recruitment campaign, new product managers in both footwear and apparel began to inject a new dynamic into the company.

The Design Unit was commissioned to work alongside the new manager for footwear on a brand new range of high performance, off-road running shoes. The shoes had to be light, provide good support to the wearer, grip the ground very well, and repel all water. Above all, they had to be put on the market within nine months, ready for the start of the winter season.

The new manager was highly experienced and motivated, and integrated the Design Unit very well into the team at SF. Entirely confirming the thesis of Smith and Reinertsen (1991) about *avoiding delays* at the FFE, members of both SF and the Design Unit visited manufacturers in China *before* beginning significant concept work – and when they eventually found one with the skills to handle the project within the required timescales, the tight deadline for the project no longer looked insurmountable.

Innovation here centered on the development of the shoes' upper construction, which was based on volume mesh fabrics on to which polyurethane was flow moulded to provide impact resistance in critical areas. Until this moment, flow moulding at this level of precision had not been achieved on footwear, but the need to cut down weight and use materials that did not absorb water made the innovation essential. Significantly, the approach adopted eschewed all use of leather, since regulations enacted by Brussels ensured that any and all import of this material from China to the European Union would be subject to tax.

A second innovation was the development of a triangular lug on the sole of the shoe; this provides a wedge-shaped grip, with the two triangular arms of each lug giving a buttress-like support for each lug. Again, this was an unprecedented feature for footwear of this type. The final result was the lightest footwear on the market for off-road running, with highly effective grip and protection for the foot, and with a system that would repel water.

SF and the Design Unit undertook a considerable amount of both concept and detail development at the factory in China. The project required a large investment in tooling for sole units, and in particular the development of this unique grip system; but timescales did not allow for much in the way of theoretical analysis or even prototype development in the UK. Ironically, much of the progress achieved was based on the development of 2D data, which the Chinese manufacturer interpreted – at incredible speed – into 3D. Nevertheless, a number of rapid prototypes of the triangular lug system and the sole unit were produced in the UK, while the Chinese manufacturer was able to make prototypes of the upper units by hand, at extraordinary speed. This intimate, close relationship between SF, the Design Unit and the manufacturer, along with iterative development in China, led straight into production development, and was a key factor in the success of the project.

OBSERVATION

In direct contrast to SE, at SF *the project leader had the skill, experience and gravitas to act as a heavyweight product manager*. He fully integrated the Design Unit into the NPD process, giving the freedom to operate fully on behalf of SF as an external consultant. This resulted in a unique and innovative range of footwear, one that bolstered SF's position as a leading innovator in sports

footwear. In this case, Clark and Fujimoto's heavyweight product manager framework accurately describes what was a successful instance of NPD.

CASE STUDY 3 – COMPANY WT, MAKERS OF WOUND TREATMENT DEVICES

With 150 staff, WT is a medium enterprise. The East Midlands biosciences Innovation Network introduced it to the Design Unit under the Design Support Scheme of the European Regional Development Fund. The project was to develop what is called a negative pressure wound treatment device – that is, a powered means of lowering air pressure on wounds – which could be worn discreetly by the individual receiving treatment.

The product's primary requirements were to accommodate a power source, and to manage the tubing to and from the wound area – tubing that allow fluids safely to be extracted from the wound. The Design Unit undertook research, while WT was to develop the electronics and associated software.

The project was initiated and managed by WT's managing director, who was a dominant presence within the firm. Because he was also busy, the project moved at a slow pace: those working for the MD on the electronics and software would not make decisions without his approval.

Prototypes were eventually produced for evaluation with target end-users. However, it was discovered not long after, that a very similar product to that envisaged had already been introduced on to the market. That blow to the project proved terminal.

OBSERVATION

Given WT's appreciable size, and the obvious potential of the new product, both the Innovation Network and the Design Unit had assumed – wrongly – that WT had done due diligence on the project before it took advantage of state support. Clearly the MD's management style was a negative influence here, too. The result was that, though knowledge was acquired on the project as far as it went, it was not possible to generate new knowledge, because the project had to be cut short.

What this project encountered was an *over-heavy but absentee product manager*. This is a kind of professional who is probably quite common – but rarely, if ever, treated in books or journal articles about the FFE. The case study confirms the critical remarks made by Thompson et al (2009), for while information was in some ways *diffused* between the MD and other parties, *an intense interaction over time* was lacking.

CASE STUDY 4 – COMPANY KD, MAKERS OF A DEVICE FOR ALLOWING HEALTHCARE PROFESSIONALS TO KNEEL PROPERLY WHILE TREATING PATIENTS

KD, a small enterprise with fewer than 10 employees, specialises in equipment for evacuating hospitals and schools and moving people around them. It identified a need to develop a kneeling system that would allow healthcare professionals – typically, midwives and podiatrists – to undertake a range of near-to-floor tasks in comfort, with proper support, and with full ease of movement. Owing to poor posture while kneeling, many such professionals suffer damage to knees, backs and hips. As with case study 3, the East Midlands biosciences Innovation Network introduced KD to the Design Unit under the Design Support Scheme of the European Regional Development Fund.

The device had both to provide comfort for knees and ankles, and to support the professional's buttocks in such a way as minimise pressure on and fatigue in the lower back and hips. The product also had to be durable, given the way it would likely be handled; adjustable, to accommodate different sizes of user; affordable, and as light as possible. Naturally, too, it had to conform to a number of medical regulations and furniture standards.

To put users in exactly the right position was something that had never been achieved on a product of this type before, and involved iterative theoretical and practical investigations. The iterative use of a range of prototypes, from the basic to those produced with 3D rapid prototyping

techniques, eventually led to a unique product – one that supports the knees and the front aspect of ankles in a manner that prevents the blood flowing through joints from being constricted. Buttocks are supported on a saddle that can be moved backward and forward to accommodate different leg lengths. The height of this saddle is critical, for in kneeling it dictates the position of the back and hips, and therefore determines the level of comfort achieved.

Though it had limited experience in NPD, KD had fielded products that had enjoyed consistent sales in the healthcare market. The East Midlands biosciences Innovation Network was able to commission initial research into intellectual property around the new product, perform due diligence exercises on it, and later introduce KD to organisations that could validate its conformance to relevant medical regulations. As for the Design Unit, its usual tasks of research, design development, prototyping and human factors evaluation were supplemented by locating institutions qualified to assess whether the product met relevant furniture standards. Around NPD in this arena, regulation has a special salience.

The Design Unit also found an appropriate manufacturer – a vital task, given the originality of the product and the unknown size of its market. The balance of capital investment to product cost, and the ability to meet a range of potential production volumes was enough of a challenge for it to be required that the manufacturer become part of the development team, rather than act just as a contractor.

Given KD's relative inexperience in NPD, the Design Unit initially took responsibility for establishing the configuration of the product concept and, from then on, for its development; the Unit also managed and integrated of the various players in the project through to the production of initial prototypes. Following this, KD started to develop a stronger role in project management through to the device's final production, all the while continuing to enjoy support from both the Design Unit and the Innovation Network.

Given the innovative nature of the product, as well as uncertainty about the size of its market, the date for its launch was not fixed until pre-production prototypes had been built. That way of doing things proved invaluable, in that it allowed adequate time for the various tasks to be undertaken. Following the evaluation of these prototypes, a launch date was agreed and, later, met. Today, sales of the product have far exceeded expectations.

OBSERVATION

Much of the success of this project came down to innovating a unique solution to a clearly identified market need. The process took more than two years, but the willingness of KD to let the Design Unit manage and integrate all the relevant players from concept through to production allowed the Unit to *go beyond design research and implementation by acting as a heavyweight product manager*. On top of this, KD benefited from witnessing M&I in action, so that, in the later stages of the project, it could take on M&I itself. Thus *effective knowledge transfer occurred both in the immediate process of NPD, and in KD's acquisition of skills in M&I*. Also, *the centre of gravity for heavyweight product management shifted from external consultant to client.*

THE FOUR CASE STUDIES SUMMED UP

The four case studies above correlate reasonably well with our earlier quantitative analysis. It appears that *large companies can have enough resources to perform successful NPD even when a project manager is weak* (SE), *and certainly when the relevant individual is strong* (SF). Things are not so straightforward, though, for medium and small enterprises. *If they try to manage NPD projects themselves, but lack proper capabilities in M&I, SMEs can get into trouble* (WT). On the other hand, *if SMEs let an external heavyweight project manager take charge of M&I, they can move ahead, and even pick up the talent to perform M&I themselves* (KD).

FOUR ARRANGEMENTS FOR MANAGING NPD PROJECTS AND TRANSFERRING KNOWLEDGE AROUND THEM

While Clark and Fujimoto (1990, 1991) focused on project management, Thompson et al. (2009) explain that, for true knowledge transfer to take place, it is vital to understand the identity of the senders and receivers, and where new knowledge may reside. Below, we present four heuristics through which both project and knowledge management can be better understood.

In figure 5, a large enterprise performs project management, and the main transfer of knowledge occurs between it and the other players. During the NPD process, the new knowledge created will reside largely within the design firm, though some may flow back to the client.

In figure 6, a small enterprise takes the place of the large one. Because the design firm plays a more dominant M&I role, much of the knowledge that is created and transferred ends up with it.

In figure 7 a business broker intervenes, introducing the client to the design firm, transferring knowledge about public funding possibilities to the client, as well accepting the transfer of knowledge from the client about its funding requirements.

In figure 8, finally, a body with responsibility for M&I handles transfers of knowledge for all players – sub-contractors, design firms and funders.

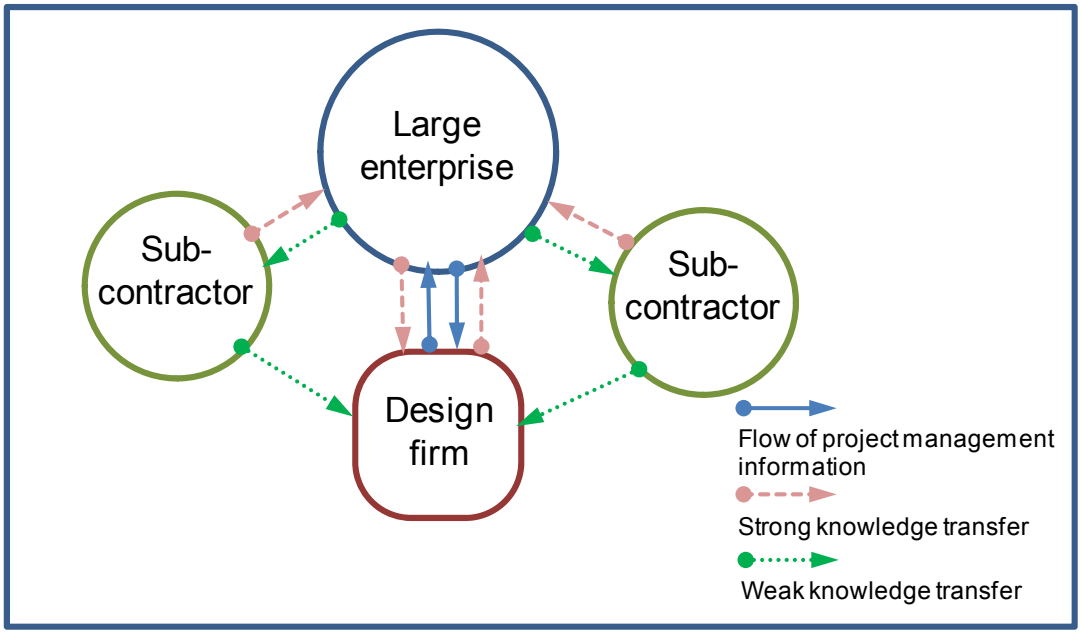

Figure 5 A large enterprise plays the dominant role in project management and knowledge transfer

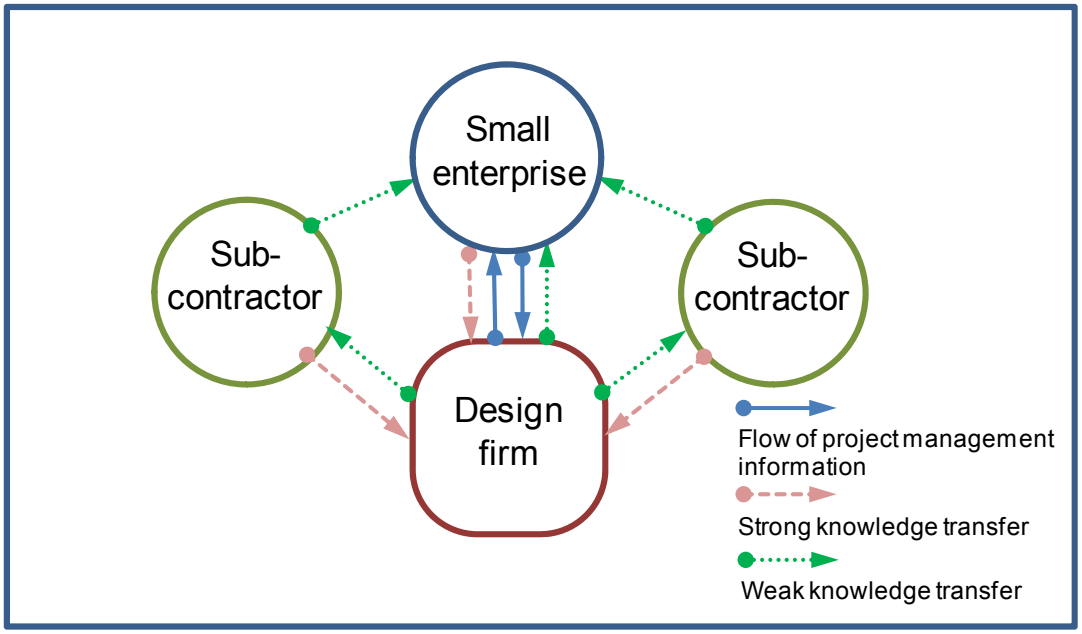

Figure 6 With a small enterprise, the design firm dominates project management and knowledge transfer

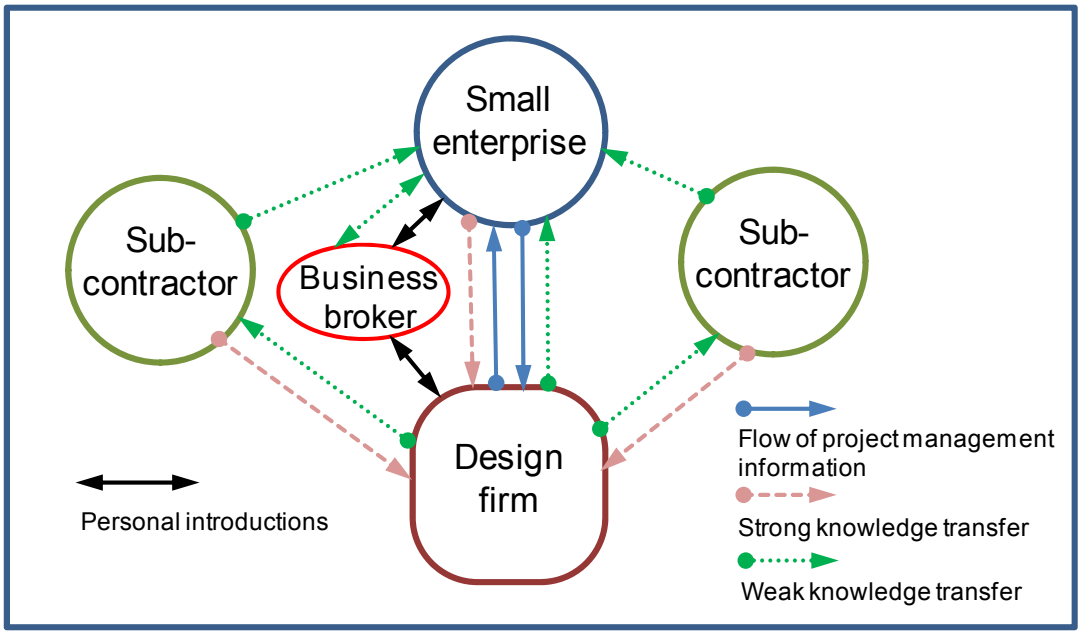

Figure 7 A business broker links the design firm to a small enterprise, and has a dialogue with the latter about funding

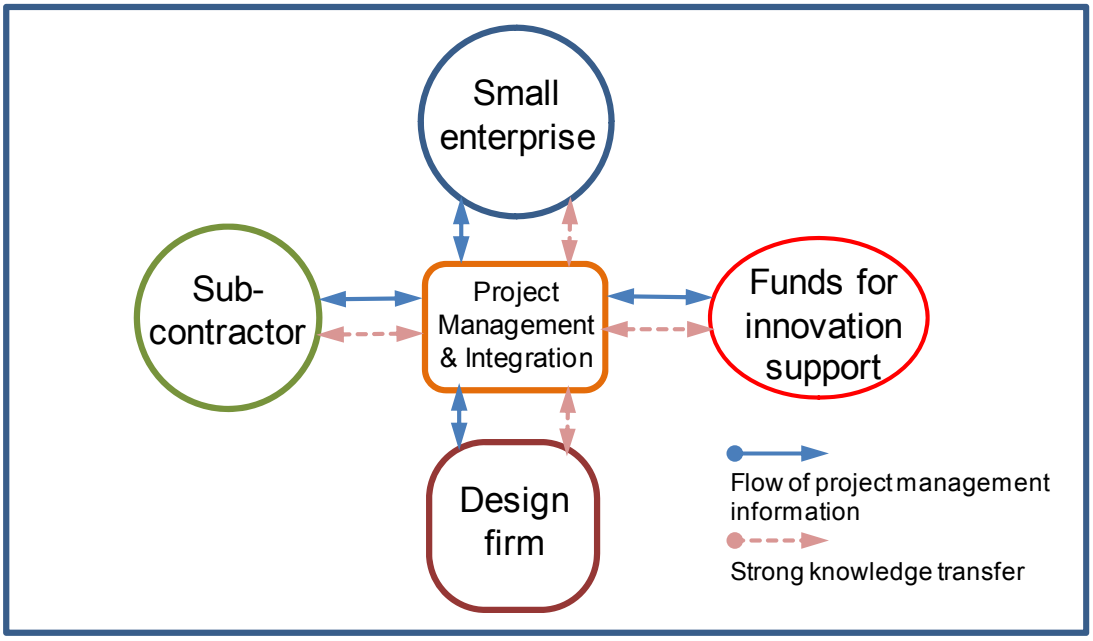

Figure 8 A body with responsibility for M&I dominates project and knowledge management

CONCLUSIONS

The paper brings out a number of points about the fuzzy front end of new product development.

First, *the management of knowledge in NPD is not just about knowledge being relayed from point to point, but also about it being originated*. This ought to be obvious, given that a genuinely new product design or 'discontinuous' innovation might well be thought to embody new thinking; but the doctrine that innovation is largely and simply a clever combination of previous developments is all too fashionable nowadays (Woudhuysen, 2010:27). The significance of prototypes here also ought to be obvious. By its nature, a prototype is meant to test out new ideas, not just embody existing ones or lash them up together.

Second, *a commercially experienced higher education institution can play the role of heavyweight product manager*. It can manage and integrate the work of varied players and, in this work, can ensure not just that lines of communication are clear, but that whole new product concepts are developed and adhered to in the face of setbacks that are inevitable. A commercially experienced HEI can have the kind of clout, objectivity and balanced, comprehensive vision that can save time and money in NPD, and that a project manager internal to a client may not be able to muster. At the same time, HEIs have goals that go beyond time and money, a fact that can work to the advantage of clients.

Third, *uncertainty at the FFE is something to be embraced, not feared*. Again it should not need saying, but *if there were no uncertainty, there would be no novelty*. With company SE (handheld scientific equipment), a simple design facelift would have involved much less uncertainty – but would have led to much lower profits.

Fourth, uncertainty may surround not just user needs, technology, competition or the required resources, but also *state regulation*. The impact of regulation on NPD has almost certainly grown a great deal over the past 20 years, and closing information gaps about it was a key part of the Design Unit's work with company SF (sports footwear with imported components that could have been subject to EU taxes), and with company KD (kneeling devices for healthcare professionals). Indeed, had company WT's product gone forward, medical regulation would have been pivotal there as well.

Last, despite its relative absence from the literature on the FFE, *the size of client companies matters*. In the realm of construction, the category of the novice or inexperienced client has been

shown to be relevant to the FFE (Tzortzopoulos, Cooper, Chan & Kagioglou, 2006: 658). That category pretty much describes how many small firms and not a few medium ones would see themselves.

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LEARNING FROM (LUXURY) FASHION: ENTREPRENEURSHIP AND DESIGN-LED INNOVATION

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In this paper design-led innovation is theorized from a double perspective: A diverse range of design types and strategies used in the luxury fashion business is presented through the prism of entrepreneurship as defined within the tradition of the Austrian School of Economics, especially Carl Menger (2007/1871), Ludwig von Mises (2007/1949), Randall G. Holcombe (2007) and Nicolai J Foss and Peter G. Klein (2012) but also David Harper's (1996) 'Growth-of-knowledge theory' of entrepreneurship.[xv] It is argued that luxury fashion business serves as a prime example of different design-led innovation methods at work; and further that these can be easily integrated into a specific conception of Design Management. Entrepreneurship will be defined through the framework of the Austrian School of Economics.

Keywords: Luxury Fashion Innovation; Austrian Economics; Entrepreneurship

INTRODUCTION: FASHION THE PROFANE

Fashion has often appeared as a dark horse in the design field. It is noticeable how the canonized design theory texts rarely deal with fashion as a subject.[xvi] In design universities and design schools there is often a marked difference in the curriculum related to fashion design and other design practises. However in a business context the fashion industry is obviously challenged by many of the same issues and problems that apply to other industries where design is a key differentiator. But the fashion industry also has its niche-specific differences: e.g. fashion is directly related to female beauty and seduction; there is a long historical tradition and interweaving of fashion products and women's magazines, fashion has its own promotional practices, and in fashion there is a distinct and deliberate use of the romantic artist as simulacra in the star designer as genius.

A considerable amount of academic design teaching and theory is influenced by either engineering (the natural sciences) and/or critical theory (arts and aesthetics from the humanities).[xvii] These two positions tend to unite in a common preoccupation with use-value, use-value as function or use-value as opposed to exchange-value in a political (Marxist) idealism. Fashion doesn't fit well into these categories except as the profane.[xviii] With its focus on seduction rather than function, fashion is per definition beyond the modernist design ideal and the project of the Avantgarde. Fashion shares a certain affinity with the business perspective in design teaching, a matter for profit and market competition. But in addition to the commercial aspect fashion also has a strong affinity to the superfluous, the aesthetic, and the sexual.

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When theorized through Austrian Economics, the dichotomy between use-value and exchange value disappears. As early as 1871 Carl Menger, the founder of the Austrian School of Economics realized that exchange-value and use-value were only two different forms of the same phenomenon in advanced economic life.[xix] Use-value 'is the importance that goods acquire for us because they directly assure us the satisfaction of needs, that would not be provided for if we did not have the goods at our command'; and exchange-value is 'the importance that good acquire for us because their possession assures the same result indirectly' (Menger, 1871/1994: 228). For Menger economic value is always subjective and contextual: value resides in the brains of individual subjects, not in the objects and it cannot be measured through the production process. The subjective value theory of the Austrian School of Economics, conceived in the latter part of the 19th Century, resembles the much later value theories developed in the marketing literature, e.g. consumer value as 'an interactive relativistic preference experience', that is value as comparative, personal and relativistic (Holbrook, 1998: 6-9). Similarly, from a Service Design perspective, value has recently been recognized as situational and individual, value is related to specific use and context (Vargo et al 2008).

Because Austrian Economics is so firmly rooted in a free market political economy, a design view informed by this theoretical position utterly goes against the many socialist inclinations that has influenced the design theory and practice; from William Morris and Bauhaus to the critical theory originating in the Frankfurter School to the British Cultural Studies tradition, the French poststructuralist philosophy, and the feminist critique to Hal Forster's Design is Crime. It is rather noticeable, that a large part of the design theory and teaching influenced by the humanities tends to exercise a more or less explicit hatred of capitalism.[xx] Seen through the looking glass of the Austrian School of Economics, this situation is turned up side down. Here it is recognized that effective socialist economic calculation, and there by also central economic planning, is impossible in the long run without private property and the free market price system.[xxi] Monopoly understood 'as the absence of free entry into a particular line of production' is considered unhealthy for the consumers in a society; and 'a monopolist of ultimate decisionmaking equipped with the power to tax does not just produce less and lower quality justice', it will also lead to more aggression and injustice (Hoppe, 2007: xx). Scholars dedicated to the Austrian School of Economics have been in the forefront of the critique of government interventionism in Western countries; i.e. deficit spending, bailouts of big companies, money manipulation by central banks, and various bureaucratic rules and regulations that end up benefitting special interest groups and large companies rather than consumers.

ENTREPRENEURSHIP AND DESIGN INNOVATION

In the tradition of the Austrian School of Economics the entrepreneur is defined as acting man in a market economy that 'deals with the uncertain conditions of the future', a speculator who tries to determine 'the employment of the factors of production' in order to make profits and in the process he serves consumers (Mises, 2007/1949: 290-291). In short entrepreneurial activity is a matter of searching for potential profit opportunities that are not being taking advantage of and act upon it. Foss and Klein (2012: 38) emphasize the judgmental aspect of entrepreneurship as envisioned by Mises: The 'decisive action about the deployment of economic resources when outcomes cannot be predicted according to known probabilities'. Accordingly, entrepreneurship is therefore more than just being alert to a profit opportunity. More important is the active judgmental aspect of entrepreneurship defined as controlling decision-making by an owner of a firm: 'a specific kind of uncertainty-bearing, namely the deliberate deployment of productive resources in anticipation of financial gain' (Foss and Klein, 2012: 39). In this respect, entrepreneurship is at the very heart of the capitalist market economy - it is all about the most effective resource allocation in a society motivated and regulated by profit and loss through competition.

According to Holcombe economic progress comes from entrepreneurship, it leads to innovation that increases the division of labour that leads to greater productivity.[xxii]

> *Progress occurs because innovators introduce new goods and services, improve on existing goods and services, and introduce ways to more effectively produce existing goods and services. The factors that lead to innovation are likely to be different from the factors that lead to growth in inputs and technology. Progress and growth are not the same things. Growth is but a small part of progress, and whereas progress naturally leads to growth, growth without progress is self-limiting. Progress occurs because of innovations introduced into the economy, and innovations are the result of entrepreneurship* (Holcombe, 2007: 28).

It follows that entrepreneurship is not the same as invention. If an invention is not brought successfully to the market as a product (or service), no (successful) entrepreneurship has taken place.[xxiii] In the same way, innovation that doesn't lead to a profit opportunity on a market is not entrepreneurial innovation.[xxiv] In using the entrepreneurial perspective of Austrian Economics, the distinctions between different forms of innovation known from the various design debates becomes secondary.[xxv] Seen from an entrepreneurial perspective, one type of innovation should not be regarded as objectively more advanced than another, it all depends on the context. Many types of design innovations can potentially serve in the entrepreneurial endeavour. Sometimes a profit opportunity can be seized and acted upon through another type of packaging or another advertising campaign, other times it requires a technological invention, and other times again it can be a matter of radical innovation where the meaning of a consumer product or its context has to be changed.

Holcombe (2007: 41) emphasizes product differentiation in economic progress. But firms don't differentiate products in order to make them different, but to make them better. Product differentiation is a competitive strategy that generates progress; it concerns more than just income growth. In order to become and stay successful a firm needs managing functions as well as entrepreneurial functions, but ultimately entrepreneurial functions are the most important. Managers 'try to minimize costs' and 'avoid inefficient use of resources', whereas entrepreneurs search 'for new and improved methods of production' and new 'ways to improve the characteristics of their outputs' (Holcombe, 2007: 33).

One of the propositions in this paper is that entrepreneurship as perceived by the Austrian School of Economics theory can be a useful defining tool for commercial design management.[xxvi] As the entrepreneurial function of a firm is recognized as being more important, in the last instance, than managing functions, and because profit opportunities are considered the essential - and they appear in many forms - innovative use of design can easily become a strategic business core competence. Further as entrepreneurship relates to the ownership aspect of a firm, the controlling decision-making by an owner who tries to allocate productive resources as efficient as possibly for an uncertain future outcome in order to gain financially, design management potentially becomes important at the top executive level of many firms.

Harper's (1996: 168) falsificationist entrepreneurial perspective suggests that piecemeal innovation of products in existing markets 'have a substantially higher likelihood of success' than the attempts to create new generic product categories.[xxvii]

> *Revamping and repositioning existing products, product differentiation (i.e. variations in quality, style, or image), product line extensions, product improvements (i.e. minor changes in product attributes, package redesign, new after-sales services etc.) and other product revivification strategies pose a lower chance of failure than holistic strategies because they reduce the scope for errors arising from product complexity and novelty* (Harper, 1996: 168).

This type of incremental design innovation is taken for granted in some of the key-areas of luxury fashion. The various fashion changes - e.g. on the level of the textile suppliers or as the

overall *zeitgeist* interpreted by cultural intermediaries (e.g. journalists or stylists), what will be perceived as new in the coming season – is somewhere between the piecemeal innovation and more radical innovation, depending on the kind of changes. But most of the time, the aesthetic style changes should be considered a piecemeal type of innovation. Many luxury fashion objects are archetypical generic object types, e.g. the little black dress, ballerina flats, or the high-heeled pumps, but every season, they are slightly changed in accordance to changes in materials and deliberate aesthetic decisions in the fashion design studios. These aesthetic changes are design-led innovations and they are based on feedback from the sales departments, possibly information from forecasting agencies, predictions and tendencies in the fashion press, observations of competitors and consumers, and gut feelings from the various responsible designers involved in the process from studio prototype to factory production. Further, fashion product design must normally fit into the overall brand and service position that costumers and cultural intermediaries have come to perceive as valuable (symbolic) features of a given label. A brand like Versace cannot easily change the stylistic qualities of its product in order to imitate, say Burburry and vice versa. This is not a matter of fashion changes but cultural values of dressing; flashy southern Italian style versus a more classic English heritage. Another crucial area for design in luxury fashion is the communication design, advertising campaigns, and the overall visual identity that accompanies the brand and the various fashion collections, possibly emphasized through styling.

Successful contemporary luxury fashion business fuses many of the traditional distinct design classifications, i.e. graphic design/communication design, industrial design, interior design, textile design, fashion design, even architecture. Design-led innovation is at work throughout the organization: Communication design is just as important as product design. In order to execute successful fashion entrepreneurship the entire value chain must potentially be design-led, from product design, retail environments, advertising, product placement, packaging, to the facilitation of consumer co-production of value.

THE HISTORICAL CONTEXT OF LUXURY FASHION

When looking at the phenomenon of fashion from a broad cultural perspective, there is a recurring theme of moralism that is striking. Historically fashion has been a frequent target for various moralists and still is today. The irrational aspects of fashion have been severely criticized, e.g. that fashion consumption is about the desire for the new and the urge to imitate others, acts that some opponents would characterize as a total abstraction from the use value of clothing. The status elements associated with aristocratic dressing in earlier times is yet another reason for denouncement. But the hatred of fashion has probably been most profound, from the Church and religious movements to feminism, when it comes to the seductive allure of the female appearance. These moralist attacks directed at fashion serve as an excellent entry point to the phenomenon, six of fashion's core elements are present in the short introduction above: clothing, distinction, desire, the new (fashion changes), seduction, and staging of femininity.

Etymologically, fashion in French, *la mode* (feminine), was used in 1393 as 'collective manners, the proper way to think in an era' (CNRTL.fr, 2012: mode, my translation), that is fashion as life style, especially amongst the upper strata of society. At this time fashion was defined as current usage in furniture, interior, etiquette, styles of speech, and a mode of dress; implying an aesthetic imperative. But the temporal element of fashion was also present: manners and aesthetics that are popular amongst the aristocracy at a given time; that something new is popular. Around 1500 fashion was associated with dress styles within the upper classes, and at the end of the eighteenth century, fashion became feminized as men renounced elaborate ornamentation in their dress (Lipovetsky, 2003: 76-77; Bourke, 1996: 23). The development of the fashion industry evolved together with the development of the visual media. Towards the end of the seventeenth century printed newspapers began to report on upper-class fashion. The first proper fashion journals with visual fashion reproductions emerged at the end of the eighteenth century. Titles like *The Lady's Magazine* and *Le Journal des Dames et des modes* indicate that fashion was now considered a

woman's subject par excellence. The mass dissemination of fashion magazines led to a new feminine journalism, it had a focus on a different physical culture and it described a consumption system based on clothing. As such fashion magazines were facilitators of a new ideology, 'a new universe of symbols' by 'projecting them onto the materiality of things' (Roche, 1994: 471, 495).

The modern fashion system, the production and consumption of human apparel and adornment, is linked to the historical development of the European fashion described above, especially to women consumers and femininity as well as the fashion style changes. But the contemporary luxury fashion industry with catwalk shows, fashion houses, Vogue magazines, flagship stores, and apparel influenced by seasonal changes, emerged during the Industrial Revolution in the West where it grew out of the haute couture system formalized in Paris in 1868. Before the fashion designer and entrepreneur Charles Frederick Worth founded his couture fashion house in Paris in the mid-nineteenth century, it was the rich society women who had dresses made for them by anonymous craftsmen or tailors (Hollander, 1988: 353-354). With Worth and the haute couture system, clothes design became an art form designed by the *grand couturier*.

> *…the designer-couturier gained autonomy in theory and in fact, while the client lost the initiative in the matter of dress. This shift marks the unmistakeable historical novelty of haute couture… [This] gave way to an era in which articles of clothing were invented, created from start to finish, by professionals according to their own 'inspiration' and taste. The woman became a consumer, albeit at the level of luxury, while the couturier was transformed from artisan into sovereign artist* (Lipovestky, 1994: 75).

Since Worth, luxury fashion, a style and beauty industry aimed at female upper-class consumers, has played a defining role in the entire fashion industry. The luxury fashion industry has evolved and mutated over the last 150 years, closely connected *to the developments in* the media industries and the general consumer society. The depiction of luxury fashion has been balanced between elegance, status, female beauty and seduction since the early fashion photography. But with the youth rebellion and the sexual revolution of the 1960s, youthful female beauty and seduction became much more central in editorial fashion photography and fashion advertisements. The contemporary luxury fashion is no longer reserved for the richest people of the world, as was historically the case with the handcrafted haute couture. Despite a symbolism, which often refers to past ideals of aristocratic lifestyles, today's luxury fashion is aimed at consumers across classes and geography, especially female consumers. Men's fashion might be an area for potential business development but women's fashion is the fulcrum of luxury fashion: The turnover of Women's apparel is considerable higher than that of men's apparel (this asymmetry is even higher if the consumption of perfume and cosmetics are taken into account as fashion products), women's fashion receive much more media coverage, female top models are far more media exposed than their male counterparts, there are many more fashion magazines aimed at women than men, etc. (Lipovetsky, 2003: 84).[xxviii]

The promotional activities of luxury fashion firms clearly show that female seduction and beauty is a vital part of fashion business. Fashion seasons come and go and new styles are being developed and sold but fashion advertisements always depict beautiful young women in opulent upper class settings or minimalist expensive design environments (Hansen-Hansen, 2011: 142). According to the French sociologist Gilles Lipovetsky, after centuries of religious condemnation, today the female beauty is no longer accused of evil. Instead it has reached a new social dimension in the age of mass production. Female beauty is now entirely positive; it is 'produced as a dream image for mass consumption' in the service of the brand labels and the 'industries of the imaginary' (Lipovetsky, 1997: 182).

THE LUXURY FASHION SYSTEM

The luxury fashion industry is engaged in production and exchange of clothing and accessories

subjected to aesthetic taste changes (fashion changes). But the meaning of fashion products and their consumption entail much more than the collective desire for these fluctuations.[xxix] Many fashion products are influenced by fashion changes, but they can equally be subjected to a strong defined brand value, which is relatively permanent. Further there are many examples of archetypical fashion products, e.g. the little black dress or a specific designer handbag such as the Hermés Birkin Bag, that are only slightly moderated over time. *Whereas fashion changes plays a significant part in contemporary apparel just as they do in many other types of consumer objects, e.g. furniture, cars, food, and music, it is female attraction and seduction that is the engine in luxury fashion, a proposition that clearly is reflected in the promotional images of the fashion industry. Successful luxury fashion must be able to beautify its female customers. Luxury fashion can be recognized as a desire and beauty business (mostly) aimed at women. This business is influenced by the various dynamics of the consumer society, e.g. aesthetic fashion changes and informational (images) value attachment to products. Fashion producers try to sell valuable products and relations that enable consumers to display or even flaunt their physical appearance in order to communicate and/or experience individuality, status, group membership, gender difference, personal emotional pleasure, beauty, seduction, transgressions, and perhaps most importantly instrumental personal possibilities (Hansen-Hansen, 2008: 265).*[xxx]

The contemporary luxury fashion system can be conceived theoretically as a complex kind of eco-system consisting of many different functions and actors who engage and exchange with each other; together they create the fashion culture: actors who finance, design, manufacture, promote, distribute, and consume style, apparel and desire, see figure 1.

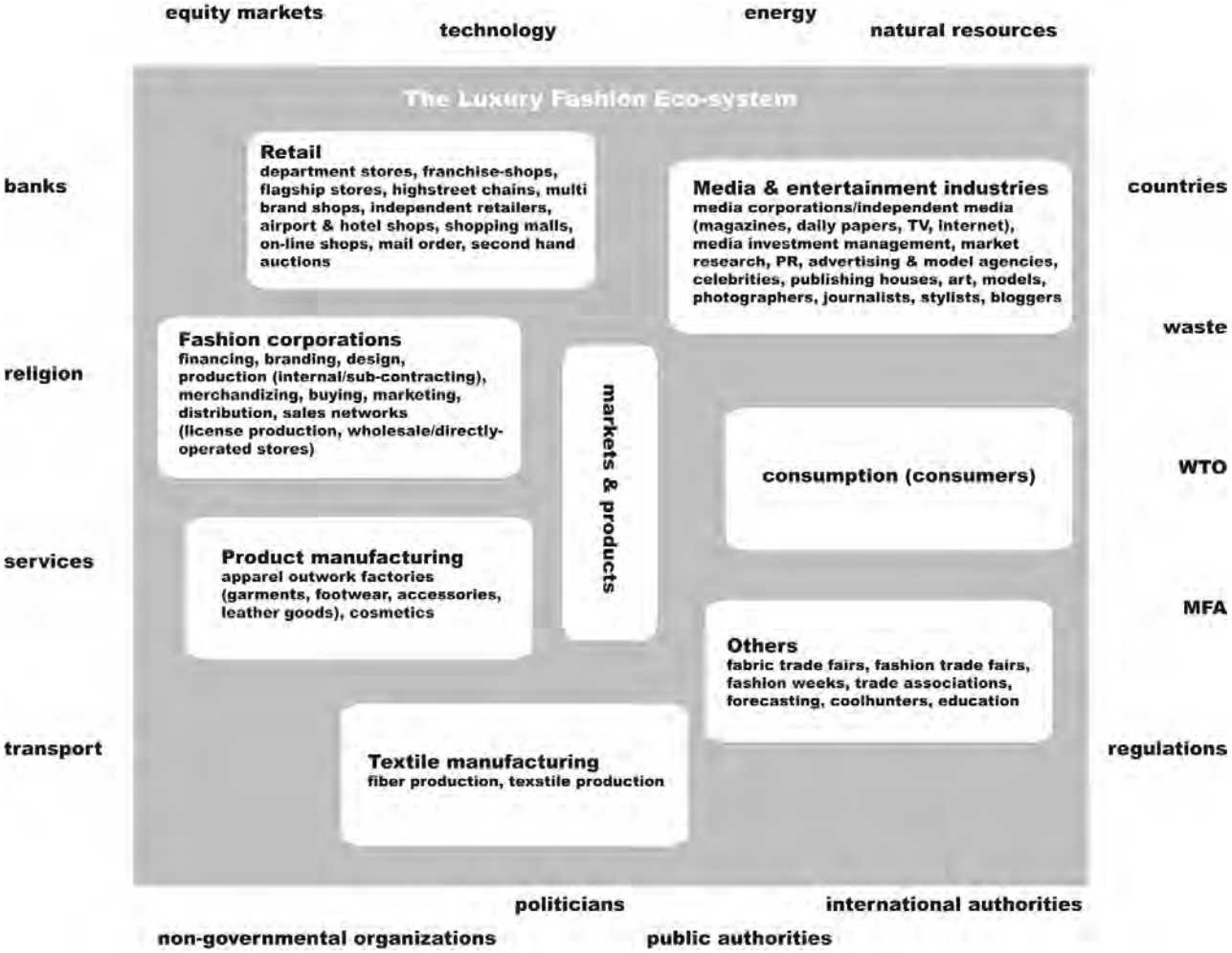

Figure 1 Representation of the luxury fashion system.
Source: Hansen-Hansen, E. (2012)

The numerous internal actors in the eco-system interact with each other but the system is also influenced by external actors, e.g. international trade policies, technological developments, financial institutions, national governmental politics. On the cultural level, this luxury fashion eco-system consists of a number of specific historically produced traditions. Compared to other luxury businesses, and equally many other businesses that produce consumer objects, (luxury) fashion clearly has its idiosyncrasies:

a) The distinctive relationship to the feminine seduction and beauty. **b)** The (Romantic) ideal of the star-designer as sovereign artist who embodies the spirit of the brand the brand even in cases where the original designer-inventor has been dead for decades and who is expected to keep inventing the desirable products in order to satisfy the demand and imagination of female consumers. **c)** The mythical luxury fashion cities, where the spectacular bi-annual ready-to-wear (for Paris equally haute couture) catwalk shows take place, particularly Paris and Milan, and to a lesser extend New York and London; they also serve as corporate headquarters for the prestigious fashion super-brands. **d)** The special connection to women's magazines. For more than two hundred years fashion production has evolved hand in hand with its own media that has become an inseparable part of the entire fashion industry. Front covers, celebrities in expensive garments, star designers, star photographers, advertising campaigns and editorials showing beautiful female models who symbolize desire and seduction. **e)** Fashion aestheticization, a distinct stylistic promotion form developed through the fashion media. Young female models in glamorous makeup and elaborate hairstyles display a narcissist or elegant coolness while posing in a mannered or even sexual suggestive style, typically positioned in surrealist or luxurious settings or removed entirely from any realist context through the white seamless infinity background; all enhanced by a dramatic or flattering lighting. This artificial hyper-realist media representational genre signifies the promotional universe of the fashion world. **f)** The systematic use of aesthetical fashion changes associated with the seasonal fashion collections. Regarding this preference for novelty, many contemporary cultural phenomena, e.g. music, names, and furniture, are equally influenced by aesthetic fashion changes (see Lieberson: 2000). The lust for newness appears to be a defining aspect of modernity and not an exclusive cultural force at work in the fashion system of adornment (see Lipovetsky: 1994), though admittedly, in the popular perception, the fashion industry has come to embody aesthetic, nonessential changes to physical objects.

In fashion business, design-led innovation can be seen as one of the core business competences, and not just because fashion entails eternal orientation towards newness due to the seasonal aesthetic fashion changes at work in this field. In luxury fashion business a diverse range of design-led innovation methods are at work on many levels. The aesthetic can easily be a value of itself, either as fashion changes, i.e. a special form of aesthetics ruled by the collective desire for the new, or as *artistic* aesthetics, a matter of beauty, adornment and perception, e.g. aesthetics as ornamentalism and decoration or its opposite, minimalism (to reduce complexity/strive for simplicity, but also as a historical reference to modernism), or pure play with form. Sexual aesthetics are central elements in luxury fashion, in the simple form as the deliberate attempts to draw attention to the erotic, i.e. exposure versus concealment of erotic zones, and in the more complex forms, through fetishism, that is cultural codes for sexual excess expressed in certain archetypical objects and/or materials; e.g. fur, leather, nylon, the colour black, high heeled shoes, corsets, gloves, underwear. Aesthetic encoding can also be a deliberate or subconscious attempt to create representations, the usage or reference to cultural styles for communicative purposes. Fashion design innovation is open to conscious juxtapositions or revivals of past styles, e.g. samples of different ethnic, tribal, historical or futuristical imagined styles. In luxury fashion, there is a high degree of visual and aesthetic experimentation going on, design and styling used for the runway presentations can be abstract ideas and fantasy material that never reach the market.

Fashion design clearly involves one of the two main types of the so-called 'soft innovations' (Stoneman, 2010), that is changes in products and processes of an aesthetic or intellectual nature.

> *…the key characteristics of aesthetic innovation are that it increases the perceived value of the product and satisfies customer demands concerning taste, social image, and preference for novelty; does not provide new functionality to the product; does not alter the way a product is used; and may make use of new technologies or materials, but not necessarily (Stoneman, 2010: 22).*

Luxury fashion products can be perceived as information products rather than just clothing objects; as such luxury fashion business today is a kind of service industry specialised in the production of relations through experience products charged with cultural and symbolic meaning. The various dresses and accessories should only be considered parts in an ever on-going production process of consumer desire. This process starts before an initial object has been produced and it continues even after the product is purchased through the consumer's co-creation of meaning (Hansen-Hansen, 2008: 201).

Figure 2 Shop window of Louis Vuitton flagship store in Omotesando, Tokyo in 2005.
Source: photo by Hansen-Hansen, E. (2005)

Figure 2. shows a poster of the American actress Uma Thurman as part of a window decoration.

In 2005 Uma Thurman served as brand ambassador for the French luxury fashion brand Louis Vuitton, but she was equally a potential beauty icon and positive role model for women all over the world. Through the association with the Thurman and female beauty the luxury handbags were encoded with cultural value. This kind of value is entirely immaterial; it is not present in the physical bag object; but it could be just as important in the total meaning of the fashion product as the physical properties of the handbag. In this way fashion products can be seen as complex artifacts. They might serve a specific function, e.g. a dress as protection against the weather or as a seduction tool, but they also work as communicative artifacts. As containers of information, or signal templates, they carry immaterial cultural value not present in the material object as such. Instead these values are cultural information that exist in networks of images, words, texts and by extension in human brains. In this respect the luxury fashion object can also be an information object (Hansen-Hansen, 2008: 161). When it comes to design, the communicative design aspects of products can easily be as important as the phsyical properties of objects.

Walsh et al (1992: 43-45, 52-54) emphasize the importance of a conscious integration of design with product development and marketing, this appears to be the case in luxury fashion. Marketing aspects like packaging, promotion, advertising, product placement, media appearance, sponsorships, and various events like art exhibitions in retail environments are all mixed and used in conscious efforts in order to gain cultural market share of human brains. And design is employed actively in all these areas. In luxury fashion the imaginary and creative emphasized through the overall brand value are of vital importance; clothing design is just a single element in a form of total concept or perhaps service design, *props for living out real and imagined experiences.* In a broad sense, fashion design can be perceived as a total design; an ironic transgression of the modernist design ideal of the *Gesamtkunstwerk* [*The great United Art-work*], the project to reconnect art and life, originally envisioned by the composer Richard Wagner in 1849; in a design context associated with the idealism of the Bauhaus school.[xxxi] Artistic experimentation and personal creativity are integral parts of fashion design but in the fashion system there exists an orientation towards the art world on a broad scale:[xxxii] Some fashion designers are performing as artists; their clothes are exhibited in galleries. Fashion designers have frequently referred to art pieces, i.e. Gianni Versace's Andy Warhol dress from 1991 and Yves Saint Laurent's Mondrian cocktail dress from 1965. Further, some fashion shows integrate traditions or experiments developed in art contexts. Co-productions between fashion houses and artists is yet another area where art meets fashion, e.g. Takashi Murakami and Robert Wilson for Louis Vuitton and Tracey Emin for Longchamp.

Figure 3 Exhibition of fashion and art in the Dior flagship store in Ginza, Tokyo in 2004.
Source: photo by Hansen-Hansen, E. (2004)

Today the visual promotion of fashion in advertising and in editorial fashion spreads in fashion magazines serves a classical art function know from previous times: the idealization and depiction of beautiful women (and equally men). Like religion, in the twentieth-century modernist art as well as critical art did abandon female beauty and its major symbols of art as banal or alienating (Steiner, 2001). Instead the commercial fashion media is now in charge of this domain. But in luxury fashion, art is also used to enhance customer experiences in the retail environment as well as to encode the fashion products with the cultural prestige of art. Some flagship stores have integrated gallery space, e.g. the entire top floor of Louis Vuitton's flagship store at Avenue des Champs-Élysées in Paris serves as an exhibition space for art. In 2004 Dior ran a combined exhibition of art and fashion spread over two floors at their Tokyo Ginza flagship store. In Figure 3 the famous Degas bronze sculpture "*The Ballerina*" from 1922 is seen next to a couture dress designed by John Galliano from the Dior autumn/winter collection in 2003, and in the background a photographic portrait of Christian Dior, the founder of the company.

THE CASE FOR FASHION

Walsh et al (1992: 68) distinguish between three different ways of improving competitiveness: *Product innovation* (novel products that offer unique features or performance), *Good product design* (product forms that 'offer enhanced value' for consumers 'in term of performance, appearance, reliability, ergonomics, etc.'), and *Process innovation* (new methods of manufacture).

Design-led innovation in luxury fashion relates particularly to the category *Good product design* but seen over a longer time horizon, there are clearly times when novel products are introduced in fashion. Some of the most noticeable innovations in the twentieth century fashion were the introduction of the miniskirt and the bikini. This signalled an entire new cultural permissiveness in

relation to female seduction in the public space. After centuries of religious control and sumptuary laws that served to control the lower classes, and especially the female sexuality, it became possible for all women to exercise their seductive potentials in the public arena and assert their evolutionary role of female choice in sexual selection. The innovation of the physical object *miniskirt* could possible not have taken place, in the entrepreneurial sense of seeing a profit opportunity and acting on it, unless the cultural climate was accommodating. But the process runs in both directions, the introduction of the miniskirt to markets influenced the wider cultural permissiveness. The miniskirt is an example of a product innovation that offered new features in skirts and dresses, less concealment of the female body, but its cultural innovative dimensions were possible much stronger.

Process innovation is clearly at work in luxury fashion behind the scenes; craftsmanship mixed with high tech mass production, e.g. the Italian post-industrial network model of flexible specialisation in small-scale co-operative production units (Jones, 2002: 171).

Fashion design appears to have been positioned as the black sheep of design due to its affinity to capitalism, female sexuality, and luxury. From the entrepreneurial perspective of the Austrian School of Economics, artistic design, stylistic innovation, and luxury are not sinful. Entrepreneurship is a matter of profit opportunity and business action and luxury fashion is a leading real world case.

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ENDNOTES

[xv] Harper's 'Growth-of-knowledge theory' is a dynamic theory of entrepreneurship that shares some similarities to the Austrian School of Economics: e.g. the methodological individualism, an emphasis on the role of the individual choice; focus on change in real time, structural uncertainty of the market process and the uncompletability of human knowledge.

[xvi] E.g. three recent academic Design Readers from the British publisher Berg, hardly include any texts about fashion. The three books are Clark & Brody 2009, Buchanan, Doordan et al 2010, Lees-Maffei & Houze 2010.

[xvii] This is especially the case in the Anglo-Saxon tradition and in the northern Europe.

[xviii] Many fashion scholars who are influenced by the humanities and social sciences operate with a double-socialist ideological critique of fashion: On the one hand, they adhere to an anti-capitalist mentality where fashion is seen as system of blind consumption based on obsolescence of desirability, superficiality, aestheticization, and non-use value. This is combined with a feminist critique, where the fashion system is synonymous with a patriarchal commercialization, objectification, and sexualisation of the female body. For a more detailed account on the connection between feminist theory and socialist ideology, see McElroy (Ed. 2002), Nathanson and Young (2006), Sommers (1994), and Patai (2008). The irony is that millions, if not billions, of ordinary women all over the world embrace the beautifying fashion objects that feminist scholars have renounced over and over again; for more on this paradox, see Scott (2005). It is not unusual to find normative feminist judgments of fashion practises and styles in the scholarly fashion literature; i.e. fashion that *deconstruct* femininity is praised as liberating whereas seductive fashion in the Western tradition that draws attention to gender differences and sexuality is renounced.

[xix] This advanced economic life is an economy beyond the isolated household economy of the individual or family, when people enter into trading relationships with each other, when they 'begin to exchange goods for goods, a situation finally develops in which possession of economic goods gives the possessors the power to obtain goods of other kinds by means of exchange… In this more developed social situation, economizing individuals can of course ensure the satisfaction of their needs as before by obtaining possession of the particular goods that we call satisfaction of their needs. But they can also… bring this result about indirectly by obtaining command of goods that can, according to the existing economic situation, be exchanged for such other goods as they require for the direct satisfaction of their needs' (Menger, 1871/1994: 226-227).

[xx] When writing about 'the political', 'being political engaging', 'social concerns', 'criticism' etc. many design studies academics, who are influenced by the humanities and social sciences, typically argues from a socialist ideological platform where commercial culture, economic profit, corporations, the capitalist political order, and advertising are defined as profane. For illustrative examples of such socialist ideological currents in design theory, see the following introductions to the sections and chapters in the recent Reader 'Design Studies: A Reader' edited by Clark and Brody (2009): 'Section Three: Theorizing design and visuality' (pp. 147-149), 'Section Four: Identity and consumption' (p. 258), 'Section five: Labor, industrialization, and new technology' (pp. 336-37). 'Section six: Design and global issues' (pp. 416-417), 'Chapter 3.1: Aesthetics' (pp. 147-149), 'Chapter 3.2: Ethics '(pp. 164-165), 'Chapter 3.3: Politics' (pp. 192-193), and 'Chapter 4.3: Consumption (pp. 298-300). Similarly, in Guy Julier's book 'The culture of design' (2008: 55-73), the chapter on consumption of design - functioning as a contextualization for the rest of the book - has a heavy leaning towards a socialist interpretation of the world with references to Marxist scholars like Adorno, Horkheimer, Bourdieu, Baudrillard, Haug, Williams and Karl Marx himself. In the academic design theory field, the Design Thinking tradition appears not to be informed by the same socialist political idealism, possibly because engineering influences this theory position more than critical (Marxist) theory.

[xxi] E.g. see Mises (1922), Rothbard (1991), and Boettke (2001).

[xxii] Foss and Klein (2012: 41) observe that without entrepreneurship, a complex economy is unable to 'allocated resources to their highest valued use'. It is entrepreneurship that 'is the crucial element of the market economy', 'not labor or management or technological expertise' (ibid). They refer to Mises who realized, that it was possible to let managers of socialist enterprises 'play market', i.e. to let them 'act as if they were managers of private firms with their own interests at stake' (ibid). But entrepreneurs 'cannot play speculation and investment. The speculators and investors expose their own wealth, their own destiny. This fact makes them responsible to the consumers, the ultimate bosses of the capitalist economy. If one relieves them of this responsibility, one deprives them of their very character. They are no longer businessmen' (Mises, 1949: 708-709).

[xxiii] The illustrative example is Xerox Corporation's invention of the graphic user interface on a computer that was copied by Apple and later Microsoft and launched on the market as a commercial viable product. Apple and Microsoft were not the inventors of the technology, that was Xerox, but they 'were the innovators, who recognized an unexploited profit opportunity and acted entrepreneurial to capture it' (Holcombe, 2007: 36).

[xxiv] Foss and Klein (2012: 23-42) give an overview of the different usages of the term entrepreneurship.

[xxv] Examples of these design innovation positions could be User-centered Design Solutions (e.g. Kelly 2001) or Radical Innovation versus technological inventions and incremental innovations (e.g. Verganti 2009), etc.

[xxvi] Some definitions of Design Management in the design literature is very close to the perception of entrepreneurship in Austrian Economics, e.g. 'Design Management: the planning and coordinating activity necessary to create, make and launch a new product on to the market' (Walsh et al 1992: 23).

[xxvii] For Harper the falsificationist entrepreneur relates to 'Popperian falsificationists who learn from the discovery of refuting evidence which falsifies (though never conclusively) their theories, rather than model them as inductivists who acquire knowledge by gathering data' (Harper, 1996: 165). On a broader level this approach relates to a central tenent in Mises and the Austrian School of Economics, the idea that central economic planning is impossible, and that the future never is logically predictable as in general equilibrium theory of the neoclassical economics. Entrepreneurial action is always subject to structural uncertainty and the irreversibility of real time.

[xxviii] Lipovesky refers to statistics from France in 1997 that showed 52% of the total sold apparel was women's wear versus 32% men's wear and 16% children's wear (Lipovetsky, 2003: 84). In 1999 a similar survey for UK showed that women's wear had a turnover of more than double of men's wear (Jones, 2002: 238). An interview with the head of

human resources at French luxury-goods maker *LVMH* in 2011 *refers to 80% of the group's costumers being women (Pagano 2011).*

[xxix] A general theory of fashion changes might be able to shed light on those parts of the fashion industry that concerns the taste change process by which form seems exhausted and then renewed, without regard to functional improvements. Based on empirical research in the changing tastes of first names, the sociologist Stanley Lieberson (2000) has formulated a general theory of fashion changes. Lieberson defines general fashion changes as 'aesthetic, nonessential changes to a physical object or concept. Fashion changes do not improve the ostensible functions of products or make them less expensive or allow for new features' (Lieberson, 2000: 31). The modern fashion industry is obviously influenced by such fashion changes but they are just a part of the overall structure. General theories of fashion changes might tell us something about the cultural dynamics of aesthetic style changes but these theories cannot fully explain the system of fashion apparel, e.g. sexual connotations, or why a certain material conveys social status, or further, how the market competition unfolds. In the same way, a general theory about fashion changes might explain something about fashion taste changes in contemporary pop music but it is unlikely that it could explain all aspects of music.

[xxx] Beauty should be considered a personal asset for women; it relates to the sexual economies and in the last instance to human sexuality. The Sexual economies are at the heart of the (luxury) fashion beauty system. Fashion and cosmetics can clearly be seen as props that potentially enhance the female appearance. Men's demand for sexual activity and different forms of erotic entertainment appear to be stronger than women's interest in sex (Hakim 2010, Baumeister et al 2001). 'Everywhere sex is understood to be something females have that males want; it constitutes a service or favour that females in general can bestow on or withhold from males in general' (Symons, 1979: 253). Men will be much more inclined to offer women other resources in exchange for sex, whereas women only will pay men for sex in rare situations. In the (hetero) sexual economy female sexual activity has a very high exchange-value whereas the value of male sexual activity is close to zero (Baumeister and Vohs, 2004: 340). This sexual asymmetry equally exists in modern societies where women exercise a control of their own sexuality and where they have access to a range of different resources (Buss, 1994: 46). Because youth and beauty appear to major parameters for men's evaluation of women's sexual attractiveness, possible due to the fertility aspect of female youth, young women who lack economic or cultural capital will be able to gain social mobility through an increase of what Hakim calls *erotic capital* (Hakim, 2010). Millions of women who are employed in the service sector are able to use their beauty in order to gain more professional success, e.g. waitresses, receptionists, secretaries, sales persons in department stores, stewardesses, 'sales reps who meet men clients in person' (Farrell, 2005: 198). In these professions beauty must be considered a personal quality. The same principles obviously apply to the very lucrative career areas where beauty is the focus, e.g. models and actresses, TV-presenters.

[xxxi] In his vision for a total reconnection between art and life, Richard Wagner attacked fashion as a demonic cultural form. See section *5. The Art-antagonistic shape of Present Life* in Wagner (1849).

[xxxii] The opposite process is also at work where art comments on or uses fashion as its object, e.g. Cindy Sherman, Victor Burgin, Art Club 2000 have all criticized fashion through art; Vanesa Beecroft and Sylvie Fleury use fashion as their *materia*l.

LEADING
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CHARACTERIZING THE FUNCTIONAL ROLES WITHIN US-BASED DIGITAL DESIGN AGENCIES

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With the increasing impact of the digital marketing activities on business success, digital design agencies have broadened their expertise or service areas from building websites to identifying new digital marketing strategies across multi-platforms. In this situation, this research aims to classify the enlarged roles of US-based digital design agencies, as well as to uncover the skills and tools utilized in undertaking those roles. In order to reach this aim, this research performed a content analysis of 366 job descriptions from 21 award-winning agencies and the case studies of two agencies. Through the analysis of these research results, five types of functional actions, skills, and tools (production, strategy, copywriting, design, and technology) were each categorized, as well as how each function works in the actual development process were exemplified.

Keywords: Digital Design Agencies; Digital Marketing; Functional Roles

INTRODUCTION

Along with the increasing impact of digital marketing on business success, a number of leading companies have been increasing their digital marketing budgets and paying more attention to the strategic management of their digital marketing activities (SoDA, 2011; SoDA, 2012). As a result, these companies have kept their customers continuously connected with their brands or products through understanding more deeply their consumers across all digital channels (web, mobile, and social) and translating those insights into their marketing tactics.

In light of the fast paced growth in the digital marketing industry, numerous small and medium-sized digital design agencies have been founded all over the world over the past two decades. They have contributed to the fast-expanding, fast-evolving digital marketing field by creating interactive marketing content such as cutting-edge websites and applications (Groysberg and Slind, 2011). In particular, the roles of digital designers and agencies have been enlarged from building websites (e.g. brand presence or marketing campaign sites) to identifying new digital marketing or business strategies (Dolin, 2012; Heller and Womack, 2008). Meanwhile, several studies suggested that effective digital design practices have been committed to facilitating interactive brand communication (Hanna, 1997; Laar and Berg-Weitzel, 2001; Rudd, 1999) and creating meaningful user experiences (Long, 2004; Unger and Chandler, 2009; Schmitt, 2000; Swack, 1997). In these circumstances, Chung and Kim (2011) conducted case studies with Korean companies (two in-house design groups and three digital design agencies) in 2007. They suggested that Korean digital designers play various roles in formulating and implementing

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strategies. Depending on whether their design outcomes are visible or invisible and whether their contribution is revolutionary or evolutionary, digital designers' functional roles were classified into the following four types: form givers, solution providers, concept generators, and service initiators.*

Along with the aforementioned research conducted in the Korean digital design landscape, this study aims to expand the scope of research about the roles of digital designers and agencies internationally by including US-based award-winning agencies providing specialized design services in digital marketing. Its specific objectives are threefold: (1) to categorize the scope and nature of actions undertaken by internal staff of digital design agencies in the new digital content development process; (2) to uncover the skills and tools utilized in undertaking such action; and (3) to investigate how those actions contribute to developing digital marketing activities in a real business environment.

RESEARCH METHODOLOGY

Given the complexity and dynamics of the real digital design service world, from the mid-2011 to early 2012, this research examined multiple sources of evidence collected using the following three methods: (1) literature reviews on the current status of digital marketing and digital design agencies, (2) a content analysis of job descriptions of the internal staff in US-based award-winning agencies, and (3) case studies of successful digital marketing projects undertaken by two world-renown agencies in the US.

CONTENT ANALYSIS

In order to investigate actions and skills required of the internal staff in these US-based digital design agencies, a content analysis of their job descriptions was carried out. 366 job descriptions were collected from 21 agencies selected among 48 US-based agencies ranked in the top 100 most awarded agencies by the FWA (www.thefwa.com). These 21 agencies uploaded detailed information (including duties/responsibilities, skills/qualifications/knowledge, and experiences) sought out for currently open jobs on their websites. Although the collected job descriptions cannot represent all actions and responsibilities that the current internal staff is performing, it can be considered that their importance and necessity in the new digital content development process recently has been increasing.

First of all, the collected job descriptions were categorized into five types of job functions based on their similarity: production, strategy (including analytics), copywriting, design (including 3D/video editing), and technology (including mobile technology). As shown in Table 1, technologists were highly sought and account for roughly one third of all of the open jobs (114, 31%), while 65 open jobs had strategy function requirements. It can be assumed that the current digital design agencies have intended to strength their proficiencies in cutting-edge technologies, which enable them to provide innovative solutions for diverse digital platforms or channels. Designers and producers followed with 92 (25%) and 82 (22 %) open jobs respectively.

	Digital Design Agency	Production	Strategy (Analytics)	Copy-writing	Design (3D/Video Editing)	Technology (Mobile Technology)	Total
1	Breel	1	0		0	5 (3)	9

* (1) Form givers: Visualizing the 'look and feel' of the site and evoke user emotion as a more traditional type of designer; (2) Solution providers: Materializing new service solutions using the latest visual script languages by connecting other designers' dynamic design concepts with the developers' back-end programming; (3) Concept generators: Building competitive brand images by creating unique brand experiences using interactive digital story-telling techniques; and (4) Service initiators: Suggesting innovative services or user experiences, and then initiating a new internet service development process or coordinating the whole process.

2	Firstborn	2	1		3 (4)	3	13
3	Big Spaceship	3	2		4	2	11
4	Fantacy Interactive	4	5		4	8 (3)	24
5	AKQA	2	7	5	17	15 (2)	48
6	Crispin Porter+Bogusky	4	8	1	2 (1)	4	20
7	Blitz	1	1		1	1	4
8	The Barbarian Group	3	(3)		5	3	14
9	The Visionary Group	1	1		2		4
10	Grow Interactive	1			1	3	5
11	Rokkan	1	1	1	2	1	6
12	Domani Studios	3		2	1	2 (1)	9
13	Genex	2	2 (1)		3	1	9
14	Fuel Industries	1	1		2	3	7
15	StruckAxion	1	1		2	3	7
16	Juxt Interactive	1	1				2
17	Rain	1				2 (2)	5
18	Saatchi & Saatchi(LA)	5	2	1			8
19	Ted Perez and associates					1	1
20	Wnderman Team Detroit	9	5 (2)				16
21	R/GA	34	10(11)	5	37 (1)	39 (7)	144
	Total	80	65	15	92	114	366
	(%)	(22%)	(18%)	(4%)	(25%)	(31%)	(100%)

Table 1 Distributions of the open jobs at 21 digital design agencies according to 5 functions

CASE STUDIES

For comparative case studies about how people in each function at the digital design agencies work in the digital content development process, we especially selected two NYC-based digital agencies (see Table 2), both which drive different development approaches. Over the past decade, these agencies have secured their positions as a best-of-class digital design agency by cultivating their skills in innovative digital marketing solutions: Firstborn ranked #2 by the FWA and Fantasy Interactive (Fi) ranked by #7.

The results of the case studies were drawn from five in-depth interviews with senior- or director-level staff working in different functions (Strategy, Design, and Technology)[*], as well as using published and unpublished information. Each interviewee told their own hands-on experiences in more than two projects, which well represented how their project team successfully managed the real challenges and problems of their client in the complex marketplace. The discussed projects were multi-awarded for their excellence in design and technology.

Name of Firm	Firstborn	Fantasy Interactive

[*] Even though the producers consist of one of the main functions within the agencies, they are mainly responsible for managing the whole development process and client facing rather than participating in the actual content development parts. In this sense, we did not include the producers in the interviews.

Establishment	1997 founded by Michael Ferdman	1999 founded by David Martin
Headquarters	NYC, USA	NYC, USA
Web address	www.firstborn.com	www.f-i.com
Major Business	Websites, web/mobile applications 3D models, HD video, Interactive installations, content management tools	Websites, web/mobile application, social networking tools
Employees	Over 70 multi-disciplinary in-house staff	Over 70 multi-disciplinary, national in-house staff spread across five different offices in NYC, San Francisco, Salt Lake City, London, and Stockholm
Organization (Except for office management teams)	Creative Department (Production Function, Design Function) and Production Department (3D/Video Function, Technology Function)	Production Teams, UX and Strategy Team, Design Team, Technology Team
Major Clients	Pepsi (SoBe), Aflac, Wrigley, JetBlue, Lands' End, Sony, IBM, etc	HTC, Nintendo, Google, CBS, BBC, Fox, Land Rover, Porsche, etc.

Table 2 Selected digital design agencies

CATEGORIZING FUNCTIONAL ACTIONS, SKILLS, AND TOOLS

Along with dividing up the jobs into the five functions, as shown in Table 1, actual job titles of each function were investigated. In addition, each functional job type was sub-categorized into more than two levels (e.g., intern, junior, mid-level, senior, director, executive, etc.) according to their degrees of skills and experiences. Moreover, from diverse buzzwords or adjectives that modified those job titles (e.g., digital, web, platform, social media, digital interactive, integrated, digital experience, digital/online advertising, digital marketing, etc.), it was discovered that digital design agencies' expertise or service areas have been expanded and diversified alongside the proliferation of digital technologies.

Based on the results of analysing these job descriptions, this research identified a set of specific functional actions and associated skills and tools per each function, as shown in Tables 3 and 4. Besides those functional actions, there were common inter-functional actions requested of all staff: (1) collaboration with multi-disciplinary teams; (2) working on multiple projects in conjunction within tight schedules; (3) motivation and inspiring the team members; (4) learning new technologies for working outside their comfort zones; and (5) dealing with a full range of platforms and devices. The following knowledge parts are also required of the internal staff although there is a difference in the depth of understanding depend on their job types: (1) digital trends and technologies; (2) graphic tools and programming languages; (3) interactive digital content development process; and (4) the look & feel and function of interactive experiences on the web and digital devices. Meanwhile, higher-level staff are responsible for managing/mentoring teams, overseeing/guiding projects, and managing clients while lower-level staff mainly support teams and gain hands-on experience by participating in the project execution process.

Table 1 Functional Actions within Digital Design Agencies

Development Process Phase	Functional Actions within Digital Design Agencies				
	1. Production	2. Strategy	3. Copywriting	4. Design	5. Technology
New Service Planning and Strategy	· Strategic Project Planning · Digital Project Management · Client Management	· Indentifying Needs · Generating Service Strategies	· Writing All Types of Copy · Undertaking Trend Research	· Generating Service Solutions	· Generating Service Solutions
Information Architecture (IA)		· Planning IA		· Providing IA Solutions	
Design Concept				· Developing Design Concept	
Design				· Executing Visual Design	
Development				· Creating Videos / Rich 3D / Motion Pieces	· Developing Creative Solutions · Executing Front-end and Back-end Programming · Doing Experiments
Test/Maintenance		· Implementing Analytics		· Maintenance	· Maintenance

Table 2 Functional Skills and Tools within Digital Design Agencies

Development Process Phase	**Functional Skills and Tools within Digital Design Agencies**				
	1. Production	2. Strategy	3. Copywriting	4. Design	5. Technology
New Service Planning and Strategy	· Accurate/Quick Thinking and Judgment Skills · Communication Skills (Written/Verbal)	· Synthesizing Ideas and Solutions · Communication Skills (Written/Verbal/Diagrammatic)	· Creative Thinking Skills · Communication Skills (Written/ PerfectGrammar)	· Creative Thinking Skills · Communication Skills (Written/Verbal/Diagrammatic)	· Creative Thinking Skills · Communication Skills (Written/Verbal)
Information Architecture (IA)		· UX Design and IA Skills		· UX Design and IA Skills	
Design Concept				· Brainstorming Skills	
Design				· Visual Design Skills (Layout, Typo, Color) · Design Proficiency in Multiple Design S/W · Meticulous Organization Skills	
Development				· Video Shooting Skills · Narrative Editing Compositing, Titling, Sound Design Skills · 3D Modeling and Animation Skills · Motion Graphic Design Skills (Layout, Typo, Color, Interaction)	· UX/UI Development Skills · Aesthetic and Motion Senses · Programming Skills · Programming Proficiency in Multiple Programming Languages · Meticulous Organization Skills · Trying New Technologies and Adoption to Multi-platforms
Test/Maintenance		·Statistics and Math Skills			·
Tools *(Examples)*	· Documentation Tools (MS office, iWork) · Project Management Tools (Visio, Agile, Omnigraffle)	· Documentation Tools (MS office, iWork) · Prototyping Tools (Visio, Agile, Omnigraffle, AXure, Adobe Creative Suit) · Web Analytics Tools (Google Analytics, Omniture, Site Catalyst, WebTrends)		· 2D Design Software (Photoshop, Illustrator, Flash) · 3D Design Software (3D Studio Max, Cinema4D, Global Illumination Rendering, Particle Flow) · Video Shooting/ Editing Tools (Video Cameras, Final Cut Studio, Motion and Color, Soundtrack) · Motion Graphic Tools (After Effects)	· Front-end Programming Languages (Web, CSS, JavaScript, HTML5, Public API) · Back-end Programming Languages (PHP, C#/.NET) · Version Control Systems (SVN, Git, Sibversion) · Mobil Programming Languages (Xcode IDE, iOS SDK, Cocoa Frameworks, Object -C Utility 3D)

HOW EACH FUNCTION WORKS WITHIN THE ACTUAL DEVELOPMENT PROCESS

As explained in the above research methodology section, this research investigated several projects of two NYC-based digital design agencies (Fi and Firstborn), and then selected their representative projects that showed their competitive expertise in strategy and technology respectively: HTC.com and SoBe's Try a New Look. The following two project stories explain how staff in each function undertook its actions and how they utilized their skills or tools associated with those actions.

STRATEGIST-LED PROJECT: HTC.COM

Under the President and the Global Director of Production, there are four common types of functions (production, strategy, design, and technology) at Fi; however, compared with other agencies, Fi has a strong strategy function titled UX and Strategy department. In the case of its NYC office, about 30% of all production staff (except for business management staff) belongs to this strategy function (designers: 40%, developers: 15%, and producers 15%). Fi's project teams follow their modified waterfall development approach (see Figure 1). In this process, strategists generally lead the early development stages along with producers while analyzing gathered information, conducting research, and identifying users' needs or business requirements. And then the strategists hand over their wireframe documents (incorporating all technical, editorial, and usability specs) to designers, who will work closely to achieve a harmonious balance between design and technology for materializing the documents. Sometimes, Fi hires external 3D/ video editors for delivering digital experiences narratively and realistically and Fi's Creative Director manages these external co-workers by overseeing their works.

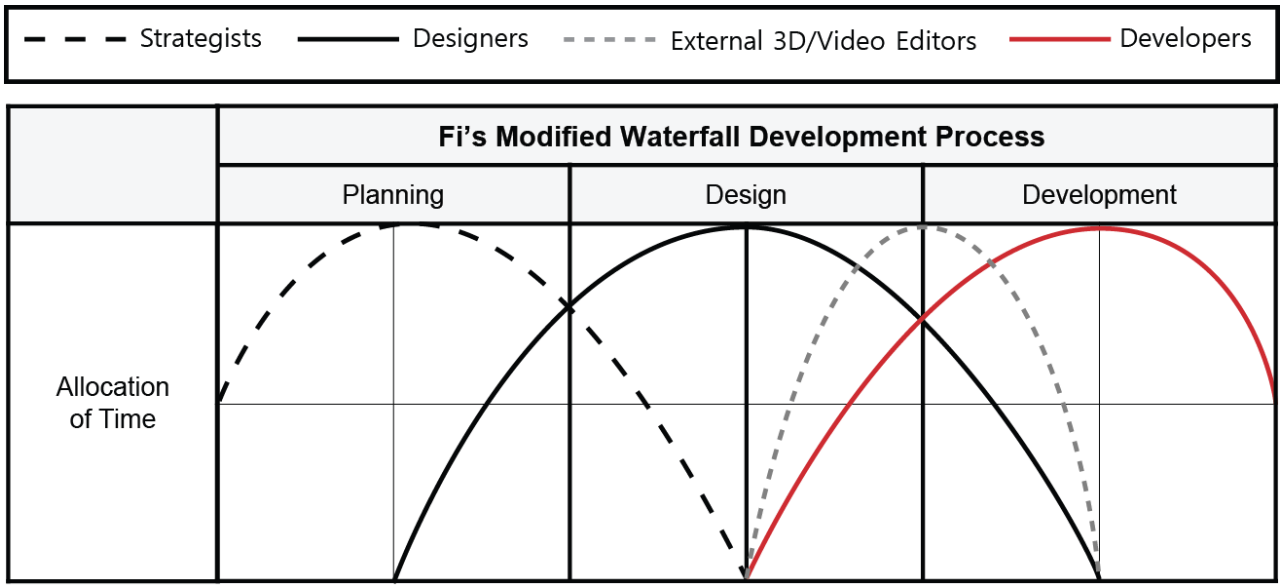

Figure 1 Fi's Modified Waterfall Development Process

A typical example of this process is the recently launched HTC.com. In 2010, HTC a Taiwanese manufacturer of smartphones and tablets, decided to redesign their websites and invited 16 top agencies to pitch a project proposal for the work. Fi won the job, and a major reason was their strategic approach well-addressing HTC's business objectives and success indicators drawn from their stakeholder interviews. One of the first things Fi did was to conduct competitive analysis of HTC competitors and develop personas (user archetypes) for identifying HTC's target users' needs. Actually, Fi's ux strategists in the UX and Strategy department performed these strategic planning works as service concept-generators or initiators. Next, Fi's ux strategists met with HTC's global marketing managers for redefining HTC.com's distinctive features and functionality into

interactive digital experiences, and planned wireframes and sitemaps. Based on those IA documents, designers made the experiences visually stunning, easy to use, and inspirational on the websites and developers materialized them with integrated HTML5 and Flash front-end technologies. In addition, during the whole process, all the production staff carried out their jobs while making sure their actions fitted the users' needs and the business requirements suggested by the strategists in the early stage of the development process.

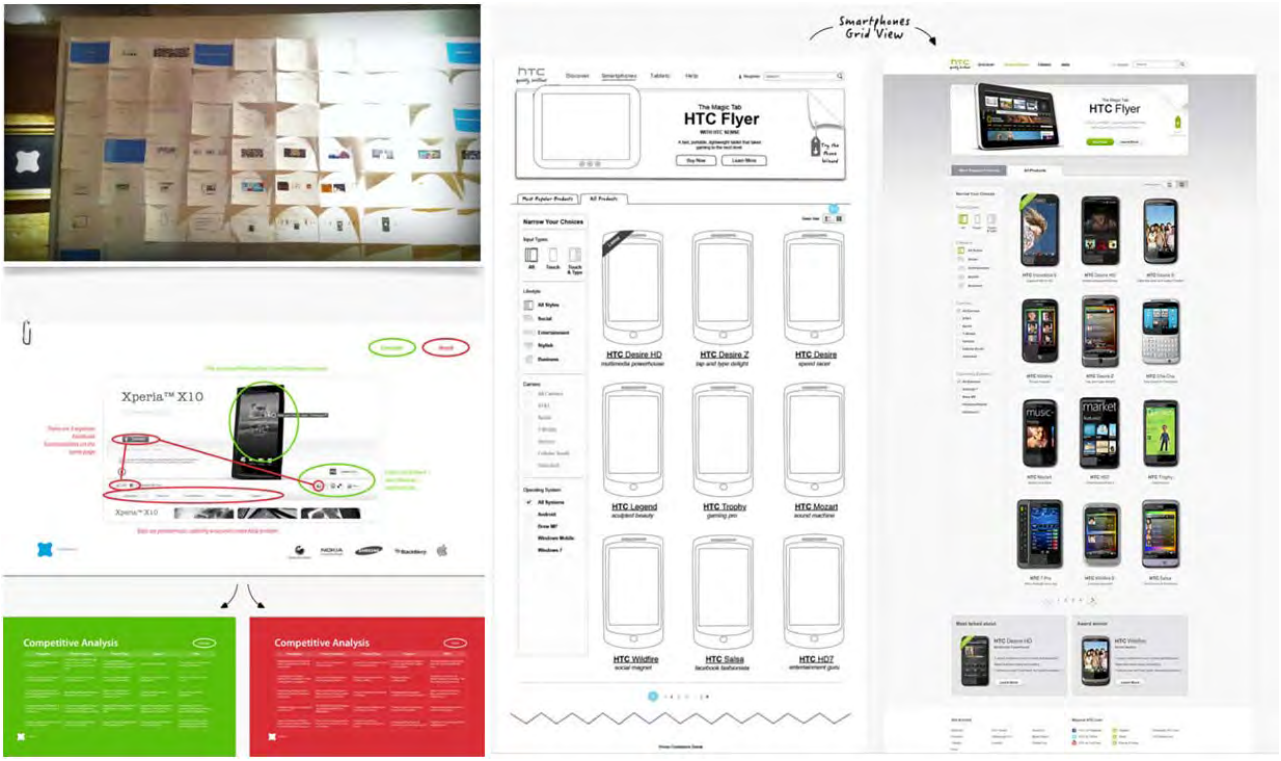

Figure 2 HTC.com Development Process from strategy brainstorming, to competitive analysis, and to the wireframe pages and visual designs

TECHNOLOGIST-LED PROJECT: SOBE'S TRY A NEW LOOK

Along with advanced research, which is generally initiated by its remarkable technology function, Firstborn drives a concurrent development process in comparison with a traditional linear development process (see Figure 3). In the advanced research stage, senior-level developers explore innovative use of new technologies, share them internally regardless of certain projects or in regard to potential projects, and then broaden designers' purviews and thinking boundaries. In this stage, senior-level designers (e.g. creative directors and art directors) can generate creative design concepts in line with the top-notch technologies provided by their senior-level developers, more specifically titled innovative solution providers. Therefore, this advanced research approach enables to materialize innovative digital experiences within a shorter project schedule, while allowing potential changes to surface earlier. In this integrated development process, designers and developers usually start working together from the beginning stage. Moreover, designers can materialize their design concepts in more sophisticated, realistic ways through better communication with Firstborn's internal 3D/video editors. This process encourages project team members to participate in wider ranges of process stages for closer collaboration and more interaction. Namely, there are many key collaboration points among the functions.

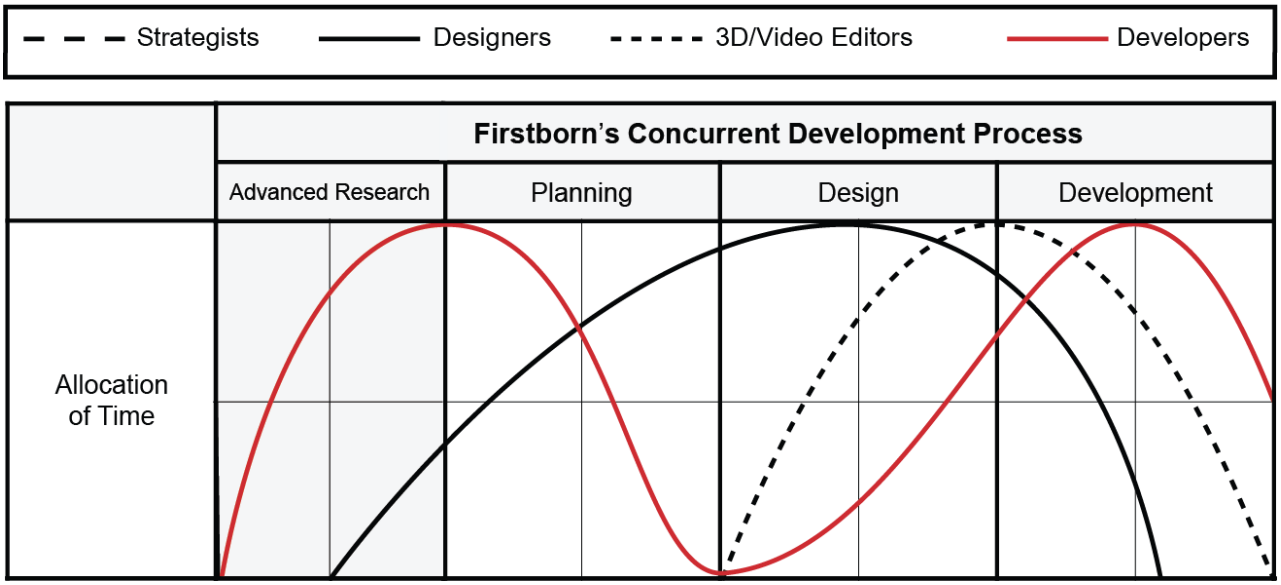

Figure 3 Firstborn's Concurrent Development Process

The Try Your New Look interactive kiosk illustrates this concurrent development process. (see Figure 4). In 2011, in order to endorse a new brand theme, Try Everything, Find Yours, of SoBe (Pepsico's beverage line of teas and flavoured waters). Firstborn developed an interactive kiosk for SoBe's free-beverage event at the South by Southwest Festival (SXSW) A creative director with designers brainstormed over concepts and a senior developer gave implementation ideas for the concepts based on his prior internal technology experiments as well as project-centric experiments. After deciding to choose the concept utilizing face recognition technology, developers started simultaneously working together with designers because they already participated in the ideation stage with providing the right solution for the concept. In fact, the tasks between designers and developers were overlapped in the development process. This concurrent process enabled this challenging project to be completed within eight weeks. The project also allowed the developers to conduct several further experiments in order to develop more-realistic, sophisticated facial recognition algorithms using C++, Openframework, and OpenCV. In the kiosk booth, users could virtually model various hairstyles, facial-hairs and other accessories, record their favorites on a 5-second video, and save it to a share page. Within five days, 5,396 looks were selected on the booth and the share page was opened 1,459 times. Firstborn also transformed the kiosk experience into iPhone/iPad apps and let users take photos or videos of their new look and share it with their friends at home or on the go. These kiosk and mobile app experiences successfully spread SoBe's Try Everything, Find Yours message. They enabled users to explore every flavor of SoBe and have fun while doing it.

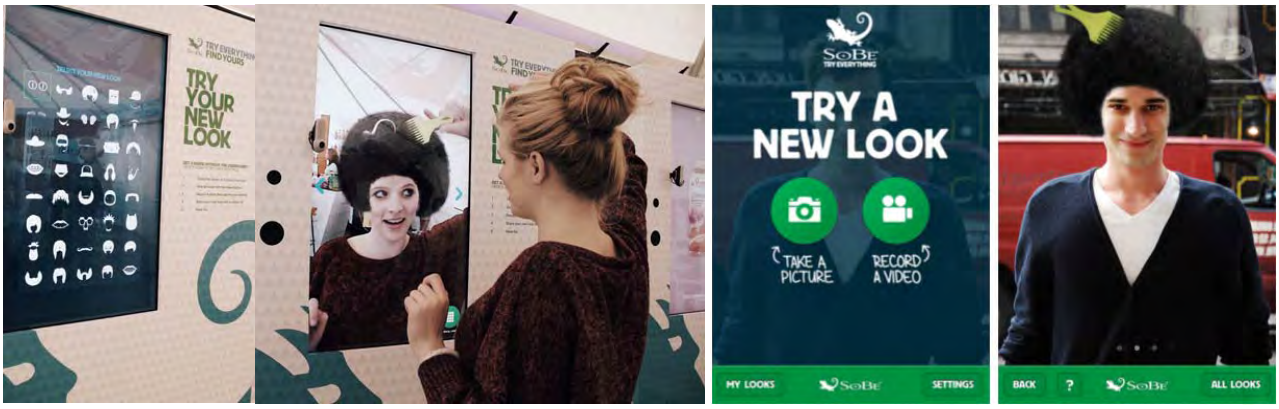

Figure 4 From left: Interactive kiosk version and iPhone/iPad app versions of "Try a New Look"

DISCUSSIONS AND CONCLUSIONS

Through the analysis of these research results, five types of functional actions, skills, and tools (production, strategy, copywriting, design, and technology) were each categorized, as well as how each function works in the actual development process were exemplified. Based on the aforementioned findings, this research could also map out the dominant roles of three functions (that is, strategy, design, and technology) within US-based digital design agencies into the four functional role model for Korean digital designers suggested by Chung and Kim (2011) as illustrated in Figure 5. As the service initiators, particularly, the higher-level staff led the digital marketing service development no matter which functions they belonged to. As the concept generators, all levels of strategists were mainly responsible for generating service strategies and concepts, and the senior-level designers were committed to creating lots of unique, playful design concepts linked to a particular brand, product, or company. Developers explored the innovative use of new technologies to provide the right solutions to materialize the creative marketing or design concepts as solution providers, and senior-level developers sometimes participated in brainstorming for creating service or design concepts

In conclusion, this research characterized the diversified, strategic roles and specialized capabilities of internal staff within the US-based digital design agencies, and then verified the four functional roles in the American digital design landscape. In the current digital marketing environment where users no longer respond to the common forms of messaging about brands or products, digital design agencies have to cultivate their expertise in not only enhancing the “look and feel” and functionality of clients’ digital marketing content, but by also creating new user experiences aligned with the clients' company or brand DNAs. It is hoped that this research will provide hands-on and practical knowledge for digital design agencies, in which to pursue and how to expand their territories in the digital marketing industry from the web design level to the strategic management level. It is also hoped that this research will be beneficial for digital design agencies that are struggling with hiring the right staff (talented digital citizens) that can offer multi-platform services in the current complex marketplace.

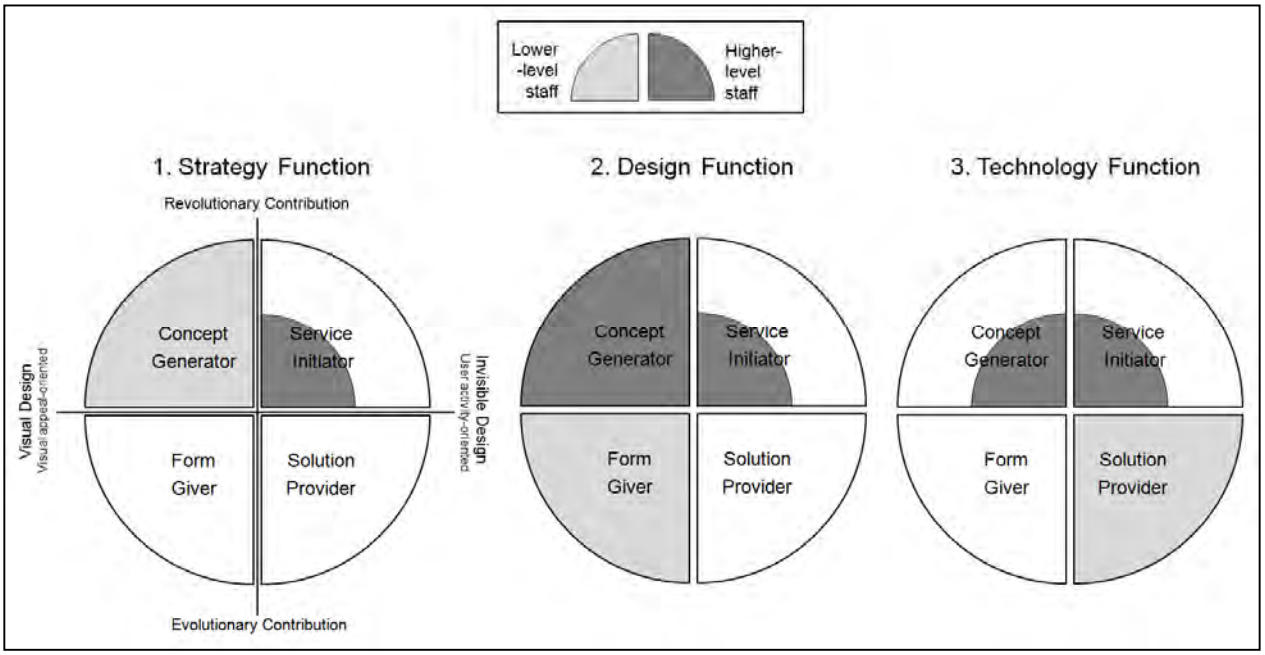

Figure 5 Dominant roles of each function among the four role types

ACNOWLEGMENT

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Youngjoong CHANG, Jaewoo JOO and Jaibeom KIM (2012). *An Exploratory Study on the Evolution of Design Thinking: Comparison of Apple and Samsung.*

AN EXPLORATORY STUDY ON THE EVOLUTION OF DESIGN THINKING: COMPARISON OF APPLE AND SAMSUNG

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This paper seeks rich understanding of design thinking and applying it to the real world cases. We review the literature concerned with design thinking and develop its framework. Then, we apply our developed framework on the team-level innovation matrix to identify how corporations reach a high-level design thinking for innovation. Our work suggests that corporations innovate through different paths; Apple took the Technology Epiphany path while Samsung took the Technology Push path. This work will make contributions to the ongoing discussions in and around design thinking as well as provide managers with strategic implications into how to achieve design thinking for innovation.

Keywords: Design thinking; Innovation; Apple; Samsung Electronics

INTRODUCTION

Design thinking has attracted considerable attention from academic researchers. Ever since Herbert Simon (1969) first discussed design, many researchers have attempted to validate design thinking in the business context (Rowe, 1987; Cross, 1990; Buchanan, 1992; Martin, 1995; Liedtka, 2004; Lawson, 2005; Whitney, 2006; Brown, 2008). Currently, two issues remain unclear involving the prior work on the topic of design thinking. First, design thinking is often mixed up with how designers work. According to an article in the *New York Times* (2008), for example, design thinking is a combination of field research and the generation of freewheeling ideas. Similarly, in a visionary piece on design in Business Week, Whitney (2006) mentioned: “design thinking can offer greater, deeper, and faster insights into users’ lives to help businesses know what to make in the first place.” Brown (2008) also views design thinking as a methodology that covers the full spectrum of innovative activities with a human-centred design ethos. Secondly, little discussion has been made on how design thinking materializes in practice. Instead, a wide variety of business cases are introduced, which in turn concentrates on the outcome of design thinking and largely ignores how these outcomes are achieved.

Here, we address these two important issues - understanding and application - of design thinking. Firstly, we aim to develop a model that delivers a clearer understanding of design thinking. In particular, we go beyond the historically dominant framework of problem-solving to consider a new framework proposed by Martin (1995), balancing intuitive thinking and analytic thinking. Secondly, we apply our framework to team level analysis and investigate how design thinking can be nurtured in organizations. Specifically, we mainly deal with the different decision

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making processes between two electronics corporations, Apple and Samsung Electronics (hereafter referred to as Samsung).

The present work will contribute to the academic discussions on design thinking in two ways. First, we introduce a new perspective on design thinking by incorporating the two types of thinking in psychology. Psychologists have conducted extensive studies and come to conclude that people have dual cognitive systems: these systems are called either experiential-rational systems (Epstein 1991) or intuitive-analytic systems (Tversky and Kahneman 1974). Note that most of the earlier works has demonstrated when and why one system is superior over the other (Hogarth 2001; Klayman and Brown 1993), but little discussion has been made regarding how people utilize these two cognitive systems concurrently. Secondly, as a level of analysis, we apply design thinking not to individuals but to teams. Note that existing literature on design thinking has focused on how individuals improve task performances by adopting a new type of thinking (Simon 1969; Rowe 1987; Liedtka 2004). Therefore, we approach design thinking through the lens of team-level intuitive-analytic thinking and view the thinking as an organizational decision-making issue rather than an individual problem-solving issue.

This paper will also provide practical implications to the managers interested in implementing design thinking to their organizations. Much evidence in the management area supports the notion that investing in designers and design teams is well-deserved. For example, design-led companies enjoy higher stock prices compared to the FTSE 1000 (Design Council 2005), the firms with high Industrial Design (ID) intensity reported greater profits than those low ID intensity (Gemser and Leenders 2001), and the firms with highly qualified design recorded greater sales and assets than those with less qualified design (Hertenstein et al. 2005). These findings, however, are mute on what managers should do in order to maximize the benefit of design thinking in business. Therefore, we investigate specific paths to achieve design thinking in this paper.

The remainder of this paper is organized into four sections. The first section provides a brief review of literature that pertains to design thinking and discusses two issues regarding its application to teams. The subsequent section explains design thinking more deeply by combining it with the innovation matrix proposed by Verganti (2009). In the third section, the evolution of design thinking is described in which Apple and Samsung are compared in terms of how to achieve design thinking. In the last section, we conclude our argument and offer academic contributions and managerial implications.

1. UNDERSTANDING DESIGN THINKING

(A) FRAMEWORK

Historically, researchers have adopted a problem-solving framework when studying design thinking. Since problem solving consists of two tasks, identifying problems and generating solutions, researchers generally view design thinking as a way of thinking which enables people to identify problems and generate solutions more efficiently. Therefore, design thinking means, for example, asking right questions and choosing right answers (Simon 1969), moving back and forth between the given problem and the testable proposals they have in mind (Rowe 1987), and addressing wicked problems smartly (Liedtka 2004).

More recently, however, some researchers attempt to understand design thinking from the perspective of intuitive-analytic thinking. For instance, in his book, Business of Design, Martin (1995) argues that delivering meaningful experiences to consumers needs two types of thinking. He posits that managers identify business opportunities intuitively and then establish business systems analytically, thus suggesting that balancing the two types of thinking can be one of the key drivers for achieving commercial success. Note that balancing intuitive and analytic thinking covers a wide variety of meanings about design. According to a comprehensive review by Cooper and

Press (1995), design represents from art and problem solving to creativity to planning process. Some representations such as art and creativity depend heavily on intuitive thinking, while others such as problem-solving and planning process rely mostly on analytic thinking. Put differently, Martin's conceptualization of design thinking can represent the diverse definitions of design in a thinking way.

We believe Martin's argument differs from the others who place greater weight on intuitive thinking rather than analytic thinking. For example, Sutton (2004) claims that organizations should explore new ways rather than exploit old ways in order to chase unusual ideas to innovate. Rieple (2004) also reported that design managers achieved higher scores on Kirton's Adaptation/innovation Inventory (KAI) than did other professionals, including those in finance, marketing, and general managers.

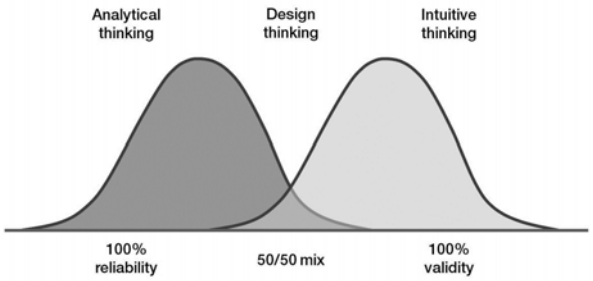


Figure 1 Design Thinking (Martin 1995)

(B) UNIT OF ANALYSIS

Design thinking can be applied not only to individuals but also to teams. An individual design thinker can balance the two different types of thinking. Alternatively, a design thinking firm can balance two teams each of which pursues a different type of thinking. Ideally, individual employees balance two types of thinking and then their firms balance two types of thinking. However, this is not always the case. Instead, a firm may concentrate on one level of design thinking over the other depending on several factors including its size. For example, when a firm has only a handful of talented employees who work boundlessly (e.g., Doblin or IDEO), it may pursue the individual-level design thinking. On the other hand, when a firm has a large number of employees who belong to multiple teams (e.g., Apple or Samsung), it may pursue team-level design thinking. Following Martin (1995), we mainly deal with team-level design thinking in the present work.

When studying team-level design thinking, we face two challenging issues. First, which team is intuitive and which team is analytic? In general, a New Product Development (NPD) project needs multiple teams including a design team and a manufacturing team. The former team plays a role in developing industrial design concepts and building and testing experimental prototypes, while the latter team generally defines piece-part production processes and refines fabrication (Ulrich and Eppinger 2012). Since the former group of tasks requires intuitive thinking more intensively than the latter group of tasks, we assume in the present work that design team is a representative example of an intuitive team and a manufacturing team is a representative example of an analytic team.

Secondly, do two teams need to be of the same size when their balance is achieved? When a firm has a large number of employees who work for multiple teams, achieving quantitative balance is challenging; the intuitive team does not have to grow but the analytic team does. This implies that achieving design thinking at the team level does not necessarily suggest that two teams should equate in their size; instead, when balance is achieved, they should be able to make their own independent decisions with the same level of decision-making power.

2. COMBINING DESIGN THINKING WITH INNOVATION MATRIX

In order to understand design thinking more deeply, we combine it here with the innovation matrix proposed by Verganti (2009). Carefully collecting and analyzing the firms that successfully utilize design to innovate, Verganti (2009) concluded that design-driven innovation does not necessarily result from cutting-edge technology; instead, it is often driven by assigning new meanings to existing products or services. Accordingly, he classified radical innovation strategies into three groups - technology push, design-driven and technology epiphany - depending on the level of technology and meaning.

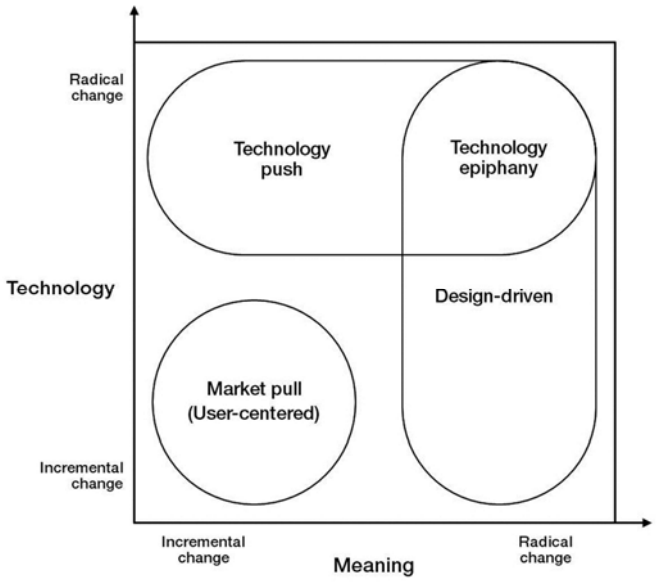


Figure 2 Innovation matrix (Verganti 2009)

As for the technology and meaning, intuitive teams such as design teams are often asked to assign new meanings to products, whereas analytic teams such as manufacturing teams take full responsibility of improving technology, implying that we can map two types of thinking onto the two drivers of innovation. This suggests that when a firm balances intuitive and analytic thinking, it also balances meaning and technology. For example, when a firm belongs to "technology push" and has advanced technologies with relatively old-fashioned meanings, it does not achieve design thinking. Alternatively, design thinking is not achieved either when a firm belongs to "design-driven" which is characterized by fresh meanings with outdated technologies. Only when a firm belongs to "technology epiphany," it assigns new meanings to new technologies and achieves design thinking.

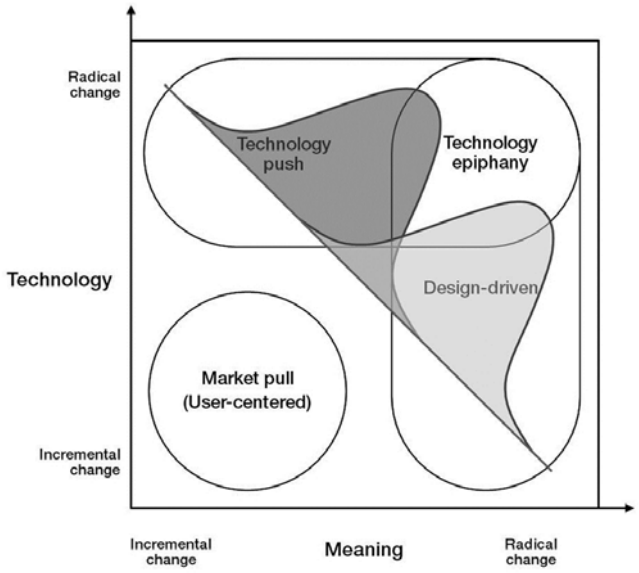


Figure 3 Combining design thinking (Martin 1995) with innovation matrix (Verganti 2009)

3. EVOLVING DESIGN THINKING

We propose that a firm selects different paths to achieve design thinking depending on two variables, namely, environmental dynamics and firm capabilities. The former is an environmental variable that indicates the degree to which an environment is dynamic. Some environments such as furniture are less involved with technical changes, whereas others such as electronics change their characteristics in a fast paced. The latter is a firm variable that represents how a firm resolves conflicts between teams. Some firms resolve conflicts by promoting communications between teams internally, whereas others do so by adopting the external teams that dominate internal teams.

Before discussing two variables and explaining different paths, we begin with how design thinking looks in the beginning moment of a business. When examining the inception of many commercially successful firms, we find that their success can often be attributed to the individual level design thinking; a few individuals in these firms identified business opportunities and then established business systems. Examples include three young students who founded Ravio.

Figure 4 Design thinking in the beginning moment of business

As a firm grows, managers aim to optimize the firm's manufacturing processes in order to achieve greater efficiency. Because managers focus on business performance, they tend to support the manufacturing teams rather than, if any, the design team, which in turn results in the imbalance between intuitive and analytic teams. However, managers are eventually forced to provide their consumers with differentiated products and meaningful experiences rather than optimally manufactured products; that is, they struggle with balancing the intuitive and the analytic

teams. A variety of firms today address this issue in different ways. In this stage, managers should select one of the three paths considering environmental dynamics and firm capabilities. The three paths are - (a) Design-driven path, (b) Technology push path, and (c) Technology epiphany path. We explain each path in detail in the following section.

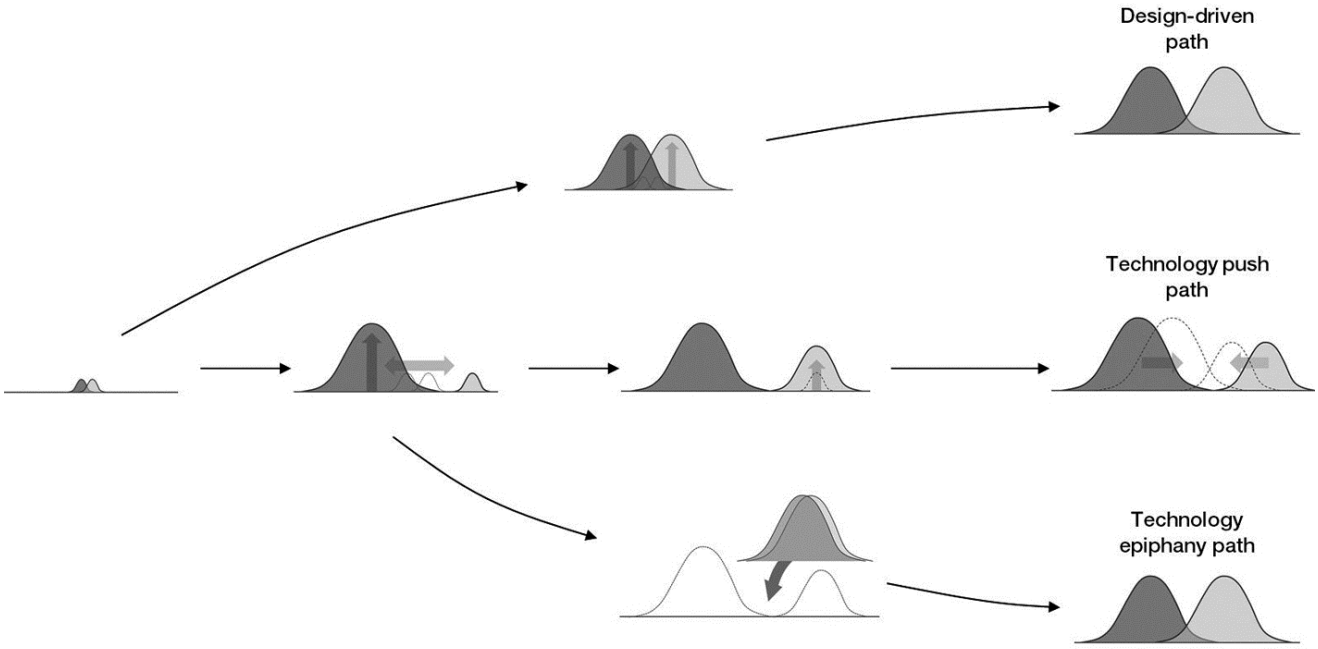


Figure 5 Three paths of design thinking

(A) DESIGN-DRIVEN PATH

When the business environment is not dynamic and its changes are minimal, managers have ample opportunities of trial and error to learn how to grow two teams without destroying balance. In such a context, the intuitive team and the analytic team maintain the balance of their decision-making powers; the intuitive team makes business decisions independently and their decisions can be implemented in businesses.

Because the design-driven path requires extensive learning, the firms selecting this path generally have a long history of appreciating the value of design. Often, they have produced design-oriented innovative products continuously and therefore develop their own sustainable design thinking cultures. A representative example of the firms that have adopted this path is Herman Miller.

> *The designer was to retain absolute control over the production of his creations. The manufacturer would not be allowed to change the mechanics or appearance of a design to the slightest degree." The De Prees knew they had to assert the legitimacy of validity in a reliability-oriented environment. Market research, sales, and manufacturing would tilt toward reliability if given a chance. " Valid design" needed top management to provide the counterweight. Hugh De Pree helped establish the authority of design by defining it. (Martin 1995: 113)*

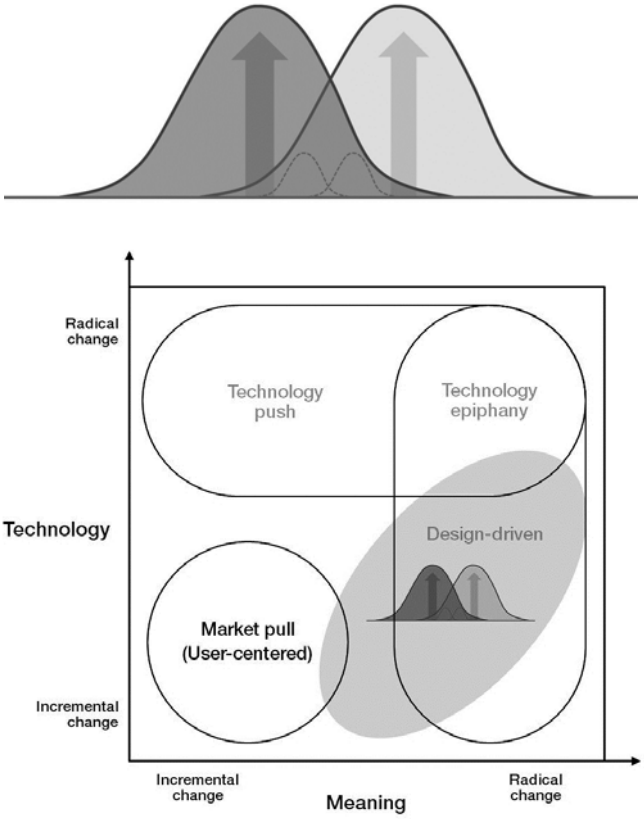


Figure 6 Design-driven path

(B) TECHNOLOGY PUSH PATH

When the business environment is dynamic and it has constant and significant changes, managers have limited opportunities to nurture two teams harmoniously. In this context, managers can mechanically pull the two teams together with a belief that the two teams are capable of achieving their balance internally.

Since the technology push path requires extensive communication between two teams, managers often increase the size of the intuitive team and then arrange a list of collaborative meetings with the analytic team, aiming to achieve decision-making balance. As strengthening the communications among marketing, engineering, and manufacturing increases the probability that newly developed products succeed in their markets (Griffin and Hauser 1992), this path provides a successful short-term outcome such as earning design awards. Nurturing collaborative culture is challenging, however, since the intuitive team and the analytic team have dramatically different ways to perform a task. Therefore, the firms selecting this path often experience, so called, the illusion of design thinking: creativity is sacrificed by efficiency and inter-team balance is not established.

A representative example of the firms on the technology push path is Samsung. Samsung is a late mover in the the electronics market. While responding to unparalleled business challenges, it first expanded the design team from 200 designers in the late 1990s to 1000 designers currently. Samsung has made noticeable debuts in several international design awards. However, the intuitive and the analytic teams needed to work closely before they deeply understood and appreciated each other's way of work. This forced collaboration produced challenging decision-making conflicts, the conflicts that are difficult to be resolved by some combination of two internal teams without moderator; instead, decisions are made exclusively by the intuitive team or

exclusively by the analytic team. This explains why Samsung has performed well in design awards but has not yet introduced any iconic product like iPhone.

> *The challenge is how to balance the irresolvable tension between operating within the current knowledge stage and moving through the knowledge funnel. The tension can't be fully resolved but only balanced and managed, because reliability and validity are inherently incompatible. (Martin 1995: 37)*

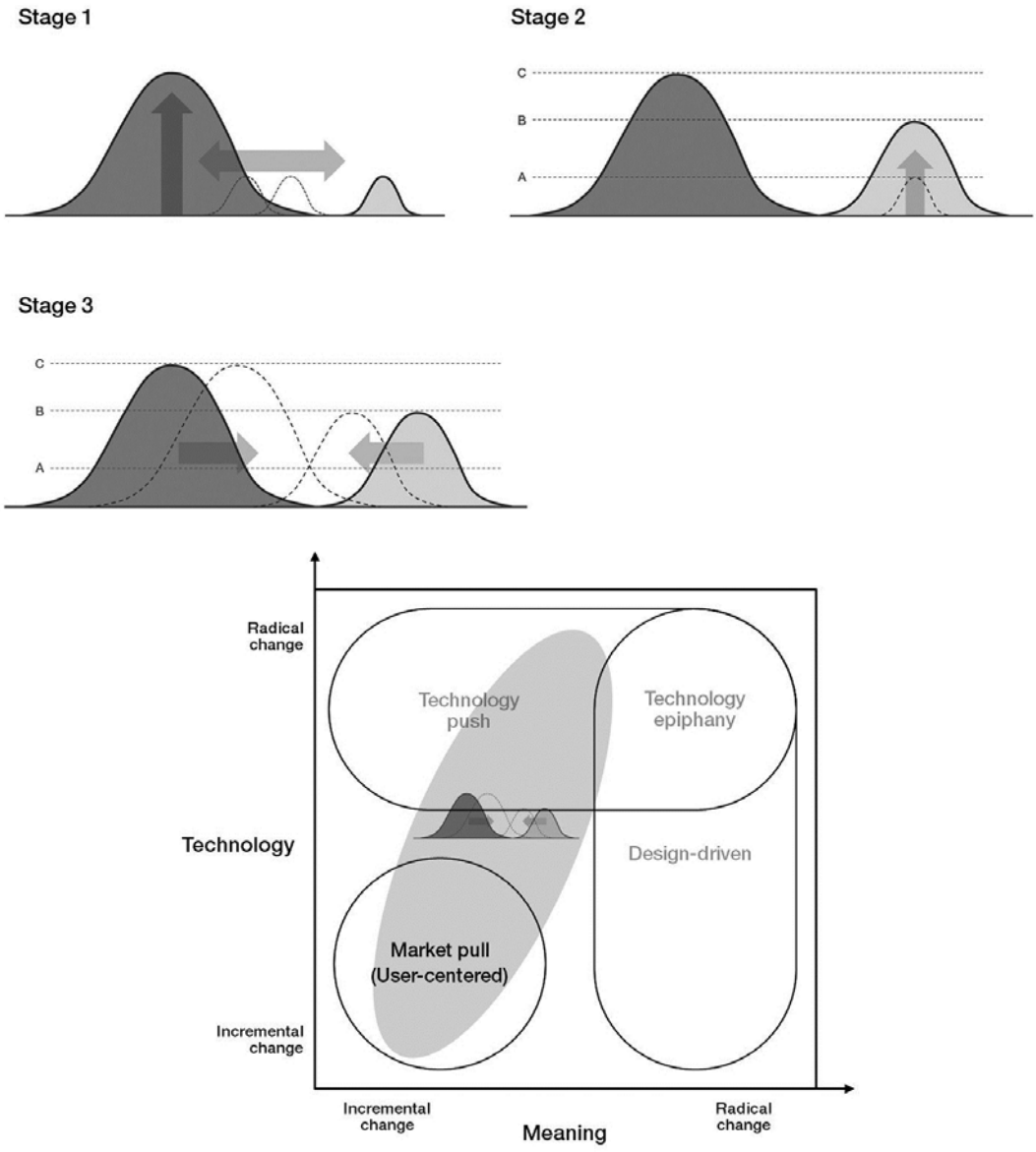


Figure 7 Technology push path

(C) TECHNOLOGY-EPIPHANY PATH

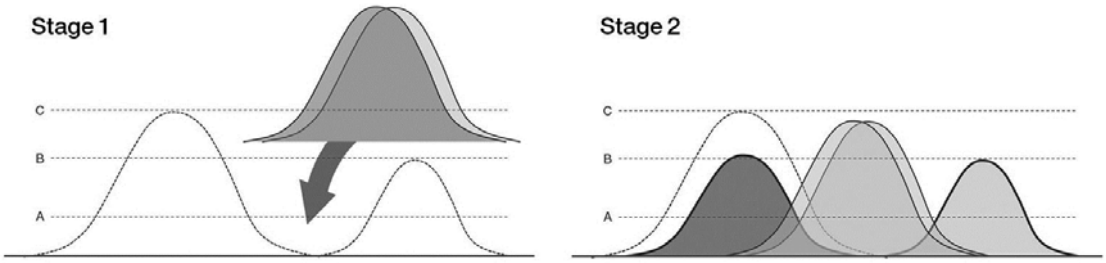
When the business environment is dynamic and managers have limited opportunities to learn how to manage two teams harmoniously, they can choose an option that does not achieve balance internally but adopts an independent design-thinking coordinating team.

Because the technology-epiphany path requires an independent team of design thinking experts, managers have no interest in promoting inter-team communication. Instead, they allow the independent team to play the role of being the final decision maker and to dominate the business decisions. If the independent team successfully dominates and make informed business decisions, taking this path allows two existing teams to reach an amenable conclusion. When the independent team fails to dominate the resistance from the two teams or fails to make sound business decisions, however, doing so brings serious damages to the firms as the conflicts between two existing teams are not resolved.

A representative example of the firms following the technology-epiphany path is Apple. Apple approaches design thinking differently from Samsung. Its design team does not communicate with its manufacturing team. Instead, an independent team that consists of Steve Jobs and his supporters made most business decisions. While doing so, he limited the decision-making power of the analytic teams in order to be comparable with the power of the intuitive team. Note that although Steve Jobs was often criticized for his assertive decisions, he freed the intuitive team from the analytic team. As a result, Apple products are welcomed by a massive number of consumers even though their individual features do not necessarily outperform the products manufactured by their competitors including Samsung.

> *It was going to be thrown in the trash as soon as the consumer opened it, but he was obsessed by how it looked." To Rossmann, this showed a lack of balance; money was being spent on expensive packaging while they were trying to save money on the memory chips. But for Jobs, each detail was essential to making the Macintosh amazing. (Issacson 2011: 134)*

> *But then he paused to recognize the role Jobs in fact played. "In so many other companies, ideas and great design team would have been completely irrelevant, nowhere, if Steve hadn't been here to push us, work with us, and drive through all the resistance to turn our ideas into products. (Issacson 2011: 347)*



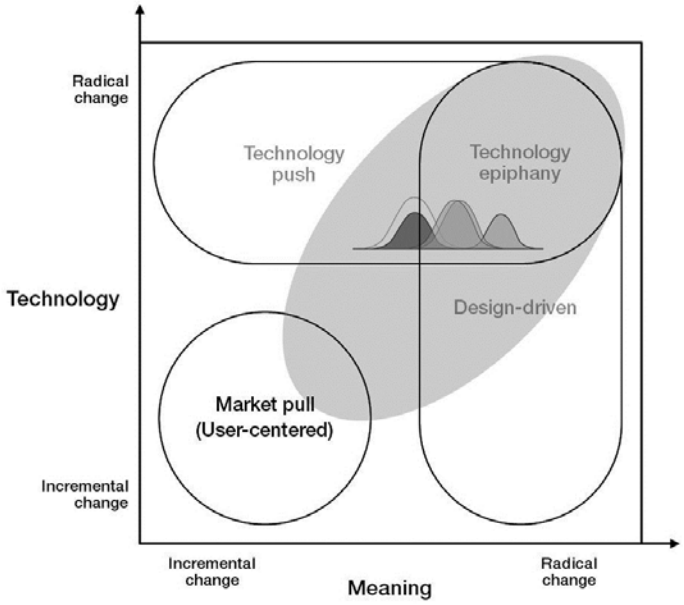


Figure 8 Technology-epiphany path

CONCLUSION

In the present work, we aimed to understand and apply design thinking. We define the team-level design thinking as achieving a balance between intuitive and analytic teams, combine this framework with the innovation matrix, and apply the framework to the business cases of Apple and Samsung. We posit that managers consider environmental dynamics and firm capabilities to select one of the three paths: the design-driven path, the technology-push path, and the technology-epiphany path. We describe each path in detail with one firm for each path as an example: Herman Miller, Samsung, and Apple. In particular, we emphasize that Samsung and Apple have chosen significantly different paths. Samsung mixes the intuitive and analytic teams, while Apple adopts an independent design-thinking team.

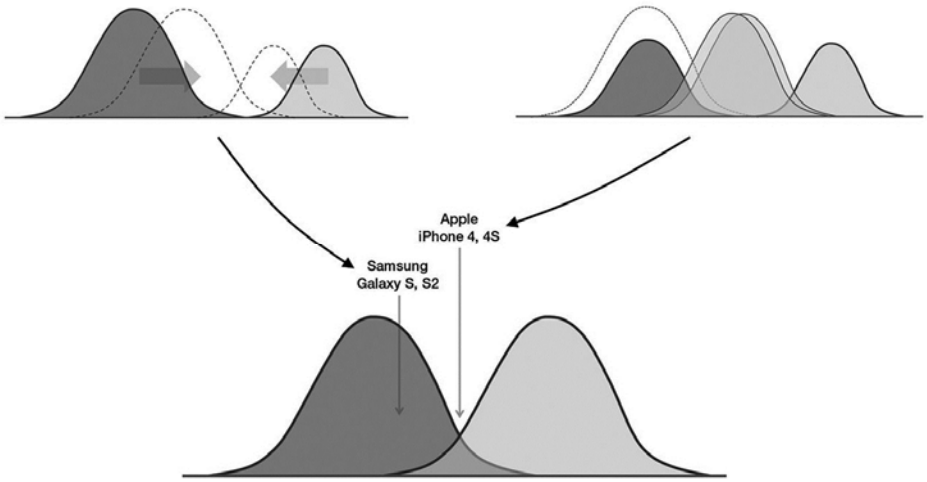


Figure 9 iPhone vs. Galaxy

This paper makes three academic contributions to the discussions on design thinking. First, we go beyond problem solving to conceptualize design thinking through the lens of intuitive-analytic thinking (Martin 1995). Secondly, we apply design thinking to teams and combine it with the innovation matrix to develop a deeper understanding about design thinking (Verganti 2009). Finally, we review real-world business cases and identify multiple paths of design thinking by considering an environmental variable and a firm variable, suggesting that design thinking can be achieved in multiple ways.

This paper also provides practical implications for managers who want to use design thinking and facilitate innovation. In order to select an appropriate path, managers should first assess environmental dynamics and firm capabilities. When the environment is less dynamic, they should favor the design-driven path. However, when the environment has constant and significant changes, they should adopt the technology-push path or the technology-epiphany path depending on their firms' capabilities.

We additionally offer specific suggestions to managers who find technology-epiphany path to be their optimal path. They should consider the following four steps:

(1) identify and choose a qualified independent design thinking coordinator

(2) support the independent coordinator's decisions and protect him from existing teams

(3) keep track of the business performance of the coordinator's decisions

(4) replace the coordinator with a new one if necessary

Note that this paper has a critical limitation that it lacks empirical evidence to support the proposed conceptual approach. In the future, researchers should demonstrate the differences between intuitive and analytic teams and develop a measurement of the team-level decision making styles. A good example is the psychological research work on the individual-level information processing styles (e.g., Mantel and Kardes 1995). Furthermore, researchers need to collect more business cases in order to clearly separate the two design thinking paths, the technology-push path and the technology-epiphany path, and then compare the business performance between them to identify an overall superior path.

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LEADING
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Younjoon Lee and Martyn Evans (2012). *A Framework for Design-Led Culture within the Fast Moving Consumer Goods Industry.*

A FRAMEWORK FOR DESIGN-LED CULTURE WITHIN THE FAST MOVING CONSUMER GOODS INDUSTRY

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The role of design is not limited to developing tangibles outcomes as an operational tool but in recent times has expanded to a strategic one. Corporations' acknowledgement of design has shifted from product development toward cultural transformation and increasingly design-led. However, there has been little research to investigate how to embed design as a cultural entity within different industries in order to defy a limited role of design exploitation. In addition, although the FMCG industry produces brands embedded in our lives, it has not drawn academic attention, compared to the electronic and IT industries. Hence, this paper proposes a framework to assist the FMCG industry in enhancing the role of design within brand development and, through this consistent design exploitation, aims to assist FMCG organisations attain a design-led culture.

Keywords: Design-driven approaches and culture; Fast moving consumer goods, Design-led culture

INTRODUCTION

Design is often emphasised as a driver to develop difference and competitiveness in business: the role of design has evolved from developing new products to developing mechanisms for organisations and societies to deliver better and innovative products and services for customers and citizen (Mozota, 2003; Press and Cooper, 2003; etc.). This expanded role of design calls for integration across organisational activities, going beyond focusing solely on products per se. Currently, within a manner of design thinking and design-driven innovation perspectives, expanded roles are highlighted in academia and business in order to bring innovation to business (Brown, 2009; Verganti; 2009). Since design can be achieved by managing a process in business (Bruce and Bessant, 2002), researchers seek to propose a direction to imbue innovation or design-driven process into an organisation and to develop a leading product and brand in order to sustain the business (Martin, 2009).

Recently researchers in business and academia have begun to study how design contributes to the development of innovative products and brands by exemplifying successful cases (e.g. Philips, 3M, Apple, etc.) (Ulrich and Eppinger, 2008; Bruce and Cooper, 2000). Concurrently, they investigate which feature of a process and organisational management facilitates design integration beyond traditional design development activities; they seek ways to develop an active-based mechanism through the application of design within organisations (Sato et al., 2010; Cooper et al., 2009; Jenkins, 2009; Stevens et al., 2008).

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Despite efforts to exemplify successful cases of businesses employing design, research has identified that design in business still struggles to be integrated within organisational processes: predominantly, design plays a role at operational level in developing artefacts such as product development, packaging, advertising and communications (Tether, 2005; Mozota, 2002). In addition, designers are often disconnected from key design decisions, these are made by people with limited design knowledge; while consultancies are still managed and/or instructed by business people (Jevnaker, 2005).

Without endorsement of design in an appropriate manner within an organisation, design exploitation and its performance inevitably become problematic. Research has also explored the phenomena which enhances and/or hinders design integration within business in order for it to be transformed into a design-led culture (Holm and Johansson, 2005; Filson and Lewis, 2000). This transformation highlights the need to enhance the internal capability for design conceptualisation and exploitation in order to propose innovative products and brands continuously and thus take a lead in the market. Such a capability can be obtained by collaboration and by learning through collaboration (Sachs, 1995). Most of all, organisations seek to develop its own design mechanism to be adapted to organisational conditions (Preddy, 2011).

RESEARCH BACKGROUND

However, design research cases are often found in the industrial sector (high-technology industry) and then there has been limited research investigating specific case of design integration in terms of industry, size of organisation, region, etc., or a combination of industry and size of the organisation. The fast moving consumer goods (FMCG) sector typically manufactures products sold in supermarkets and drugstores; P&G and Unilever typify FMCG corporations (Roscam-Abbing, 2010). Since the FMCG industry is often criticised for its tendency to have vulnerabilities in design deployment, the authors assert it is necessary to study this sector and suggest approaches to become a design-led organisation. Hence, in this paper, the authors investigate design integration in the FMCG industry.

According to Tether (2005), the FMCG industry – also termed the consumer packaged goods (CPG) industry – is categorised into low technology and design oriented sectors; meanwhile, this industry separates into low design expenditure (as a percentage of sales) compared to R&D oriented and high technology industry sectors (e.g. automotive, electronics, etc.). On top of that, the FMCG industry is criticised for losing direction towards ‘communicating the brand’s value position across all touch points, starting with the package on-shelf’ (Interbrand, 2011: 54) and finding a new way for a brand or business (Olins, 2007). However, the mechanism for developing and manufacturing FMCG products is complex due to the relationship with logistics and detailed regulatory requirements, and the industry shows limited integration of internal and external parties into the brand development process due to the various layers of processes (Page and Thorsteinsson, 2011).

Therefore, this paper concentrates on discussing FMCG brand development and its organisational culture and proposing key elements to assimilate design value into the organisation through design-driven brand development for the FMCG industry (part of a broader PhD investigation in this area). In other words, a framework for design-driven brand development is suggested to help organisations – and its employees – experience designerly approaches and to disseminate these experiences to other employees by investigating how the FMCG industry undertakes design development projects.

DESIGN-DRIVEN APPROACHES TO OBTAIN A DESIGN-LED CULTURE

Current discourse of an expanded role of design – design thinking and design-driven innovation – provokes organisational supports and transformation toward design-led culture. This concept of design is not just limited to product-centric activities but highlights integration of designerly ways

into the entire organisational activities, organisational justification for desginerly applications and supportive activities to prop the two initial activities up. Thus, by content analyses of seven key design commentators: Berger (2010); Verganti (2009); Brown (2009); Martin (2009); Esslinger (2009); Neumeier (2008) and Lafley & Charan (2008), the concept of "design-driven approaches" – DDA – is extracted to emulate an expanded role of design. DDA is composed of four themes: designerly applications (DA), design endorsement (DE), collaboration (CO) and human resources (HR). The first two themes are primary to underpin current design discourse into an organisation and two latters are booster themes to consolidate features of the primary themes. These themes form the epicentre and complementary components to achieve design-led culture in the organisation. To achieve such a culture, diverse approaches and methods in each theme are delineated in terms of at strategic and project levels: e.g. visualisation/prototyping, co-creation, user (customer)-centred approaches, etc. Eventually, these conclusions informed the direction of the research discussed as follows.

DESCRIPTION OF METHODOLOGY

This research was conducted thorough transformative mixed methods: a sequence of an online survey and in-depth semi-structured interviews. This forms the empirical research upon which research findings are based. Subsequently, these findings called for a way for DDA to penetrate an organisation. This was validated through member-checking. Eventually, the framework, which is a part of conceptual conclusions, was developed via three phases.

The primary research investigates both FMCG corporations and design consultancies specialising in FMCG industry. First, an online survey was conducted among FMCG corporations which are based, or sell brands, in the UK; and consultancies who are based in the UK, or are part of a global networked group. Table 1 summarises the survey participants.

Table 1. Summary of Participants

	Valid in Section 1 Rating Scale Questions	**Valid in Section 2 Categorical Scale Questions**
Corporations: 61 participants	40	Q28-32 (N=30), Q33-44 (N=27)
Consultancies: 56 participants	33	Q37-48 (N=27), 49-55 (N=26)

Secondly, a quantitative methodology was used (Creswell, 2009) in order to find the underlying meanings of identified design attitudes and performance within FMCG industry; sequentially, the identified findings study the latent influential features of the identified phenomenon: design integration. Hence, as based on the online survey, interviews were conducted to cover opinions from design and business, pan-European and global (size of) corporations, and different industries (food & beverages, households and personal care, where most participants were recruited for the survey). In the consultancy case, sampling was based on the size of consultancy, the background of interviewees (design, engineering and marketing) and the specialty of design (structural and graphic design). Each of the five interviewees from corporations and consultancies was recruited from among the survey participants and industry experts who have not participated in the online survey.

After developing a conceptual model for DDA integration into FMCG brand development through the primary research activities, this framework was validated by eight participants of whom some were involved in the primary research. Besides, since it was found, during the primary phase, that participants from design practice do not have an understanding of an expanded role for design, experts were contacted to augment the validation of the research findings: six from FMCG corporations and consultancies and two from academia.

Due to the word limitations of this paper, it is mainly the developed framework, one of the implications, which will be delineated, along with the overall findings of the primary research. The detailed features of each theme and part of the online survey and interview results were presented in conferences prior to this paper (Lee and Evans, 2011a, b).

OVERALL FINDINGS

In this paper, as noted above, outlines of the framework are captured here, instead of delineating full details of the online survey and interviews.

Overall, FMCG industry sticks mostly to convergent thinking, despite the importance of divergent thinking (heuristic approach) in the current design discourse: the double diamond model (Design Council, 2007), divergent and convergent thinking (Brown, 2009) and the innovation funnel (Clarkson and Eckert, 2005). However, within FMCG, two types of project development processes are identified: Type 1: only one asymmetry diamond shape pointing to the right: a focus on delivering a final product mostly in revitalisation projects without ideas divergence; and Type 2: triple (or more than triple) diamonds: due to the silo operation of tasks, more diamonds shapes for each task occur. Each diamond is skewed and asymmetric with insufficient time for ideas exploration. Most of all, within both types, the exploring ideas stage – "discover and define"– is comparatively short or neglected, and the FMCG process is very determined to launch a brand.

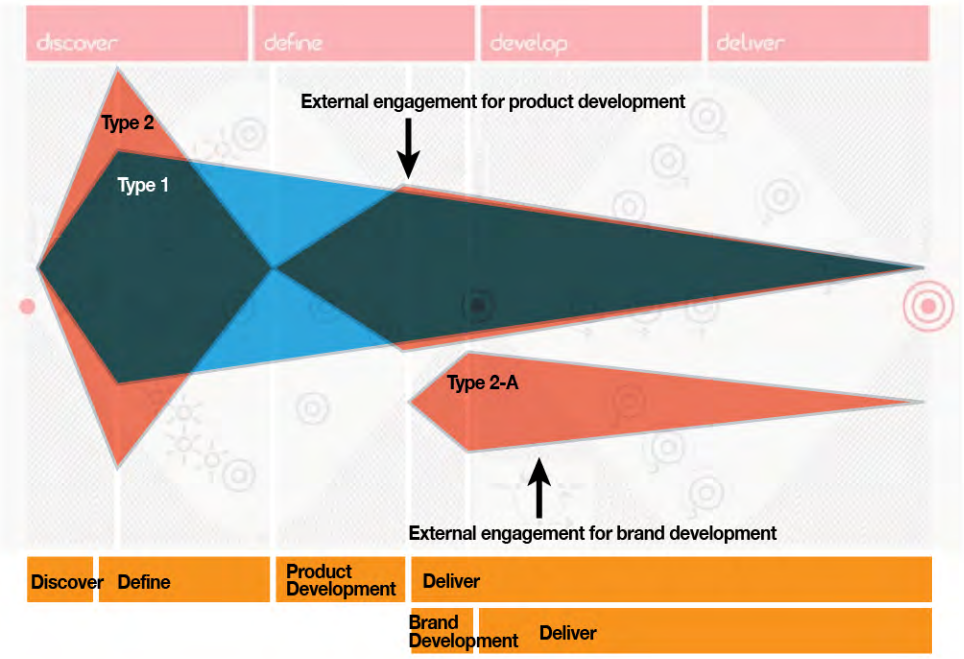

Figure 1. Current approach to project development in FMCG industry

In the interviews, respondents referred to 'some big corporations like P&G and Unilever' that can afford to employ DDA. Big global corporations acknowledge design as a fuel for innovation and embed designer approaches into other departments (Lafley and Charan, 2008). Yet except for those corporations, a role for design is not attained for DDA within locally-focused FMCG industry: design is limited to taking up operational roles and has difficulties in expanding across organisational activities.

There is a huge difference in total sales between global and locally-based corporations: while 2011 P&G revenue was 82,559 million dollars (around 50,900 million pounds and revenue growth year of 4.60 per cent) according to Yahoo Finance, the 2011 revenue of Premier Foods group which focused on the UK and operating business in pan-European countries was 2,000 million pounds (and a trading profit of 188 million pounds) according to the 2011 annual report. Therefore, in spite of being a well-known big corporation, the nature of FMCG characteristics – low margin and high volume – defies a locally-focused organisation to be concerned with financial aspects: investment and costs. Indeed, there are rare organisational commitments to mobilising DDA into a project and organisational activities as fuel for organisational transformation towards being design-driven: the concern with cost results in a risk-adverse attitude to adopting new directions.

Figure 2 illustrates design's relationship with organisational management and branding (business). FMCG industries use independent brand (product) or light endorsing brand architecture so that each business often governs its own development system, surpassing the organisation's management. What they consider design is executed at the periphery of the business or independently, as outliers: external consultancies are responsible for the delivery of final outcomes. This phenomenon results in systematic difficulties in integrating the four DDA themes. All the interviewees acknowledge that when these shapes are getting closer and overlap more, they can thrive on developing competitive brands and agilely respond to fast changing situation: competitors and market change.

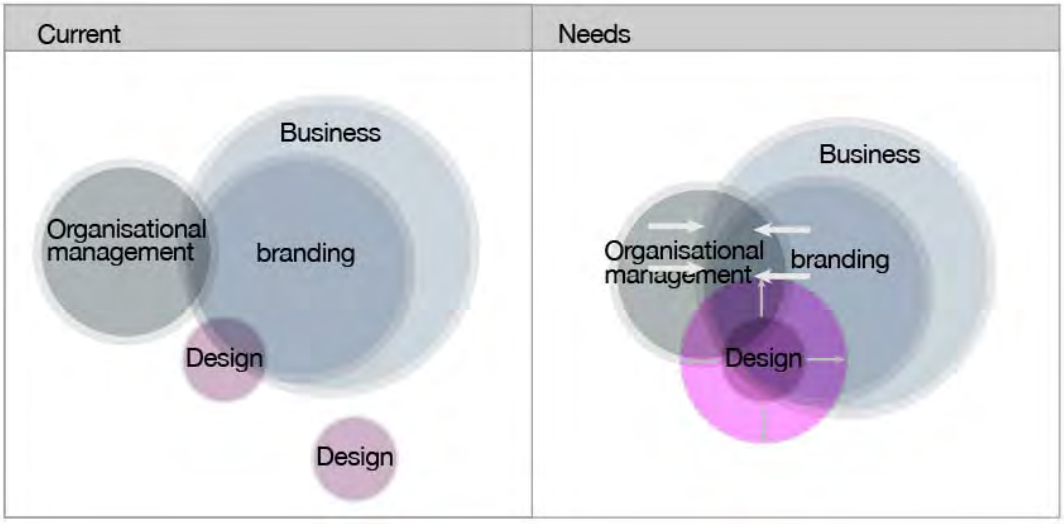

Figure 2. Relationship between design and other stakeholders in FMCG industry

In terms of the influence of specific contexts, a longer timeframe and a greater proportion of exploratory projects and long-term relationships account for better performance of DDA in terms of attitudes and exploitation, but they cannot be the absolute context for DDA in every organisation (Best 2006). For example, with a longer project timeframe, a corporation keeps coping with fast-changing social culture so as not to launch out-of date brands; investment in exploratory projects cannot exceed a certain amount money due to business constraints; consultancies find it hard to turn down a long-term relationship with clients so as not to lose a billing account. Thus, each organisation tries to find the right fit which privileges its own situation, though within FMCG industry, since business-driven approaches are predominant, DDA is first obliged by organisational endorsement to be exploited as a vital entity without vulnerability to budget or timeframes during project deployment.

From the findings for consultancies, the capabilities of exploratory projects, which result in more changes to develop competitive brands, are vital to sustaining the business of design so that they prevent business from being inclined to focus only on sales. Meanwhile, to transfer knowledge to their clients, consultancies are keen on building a relationship with them by offering a preliminary phase and seamless and timely delivery, e.g. workshops, casual conversations, etc.

In conclusion, since features in the designerly application theme are not embedded into organisational culture and projects, these need to be constructed by underpinning other themes: especially, a design endorsement commitment to DDA needs to be initiated to calibrate the organisational environment. Thus, initial suggestions to enhance designerly application are illustrated below:

- **Find a catalyst to bring DDA into the organisation**: It is vital to assign or find a person to establish a DDA mechanism at strategic and project levels. This is a prerequisite step in order to fulfil the features in other themes.

- **Elevate the understanding of DDA**: All the features which impact on employing DDA depend on the degree of intellectual capability. Thus, corporations and consultancies need to reinforce human resource activities to elevate the intellectual capability for DDA as well as to embody the usage of designerly applications.
- **Configure a collaborative flow:** There are two beneficial aspects to forming a collaborative flow: 1) Project level: this enables reducing the mistakes arising from separate tasks and developing consistent meaning and experiences for a brand: an integrated brand. 2) Strategic level: Interviewees indicated that understanding the benefits and actions of designerly applications can be obtained through experiencing them so that a collaboration flow ensures different stakeholders' involvement in such a flow.
- **Apply designerly applications to ideas generations**: The current use of designerly applications has degenerated a project manager (marketer) adopting a sciolistic manner to convince the board members: e.g. focus groups for ideas testing rather than for ideas exploration, short-term planning for research, a lack of using prototyping and exploration for ideas generation, a limited role for external consultancies, etc. Otherwise, they are mostly undertaken within consultancies. Thus, it is necessary to apply designerly applications in the up-front stages with a collaborative manner so as to spread the concept of DDA: an expanded role for design.
- **Find balanced features depending on the specific context in an organisation**: Each context delineated in the above has pros and cons, thus via access and audit ways of DDA, a leader or design catalyst in an organisation amplifies the advantages and complements the disadvantages (e.g. small corporations keep the organisation less structured and discuss problems and issues across departments, and do not consider design to be an investment rather than a cost). Through repeated audit and access, an organisation is able to find the right balance or combination of creative/innovative and commercial perspectives for projects and organisational tasks (Beverland, 2005).
- **Form alliances with external consultancies**: Currently, the silo operation of each task increases the possibilities to make mistakes and raises the absence of new fuel for metamorphosing. Thus, alliances with external consultancies stop corporations from adhering to the status quo.

A FRAMEWORK FOR DDA INTEGRATION WITHIN FMCG BRAND DEVELOPMENT

This framework is developed in order to enhance DDA in the organisation through a project, brand development in a collaborative manner. 'Brand messaging should be led by packaging and then reinforced by all other communications' (e.g. advertising, POP, campaigns, etc.) within FMCG industry (Interbrand, 2011: 54); currently, all the tasks, including packaging development, are rarely integrated with each other. A brand per se is not a product but an association of all the internal and external activities around the brand: brand associations are formed by every customer's experience. Besides, brand development comprises diverse activities and requires various stakeholders' involvement.

Therefore, the framework seeks to encompass every task and enhance integration between tasks and activities and via integrated and collaborative activities, to penetrate DDA across organisational activities. This framework is ignited by the design leader at the strategic (organisational) level and DDA in this is nurtured by the design champion at the project level. The interactions between strategic and project levels create a synergy for an organisation to foster a designerly culture: this is more likely to be a combination of top-down and bottom-up implementation. Such a combination creates an "umbrella" which insulates various activities against straying outside DDA integration (Figure 3). Indeed, this drives the organisation to obtain DDA which is optimised to its own context by metamorphosing through constant loops and to be

able to achieve design-led culture for each business context. Each essential constituent of the framework is delineated, working from top to bottom of Figure 3.

The DDA framework: This illustrates how the experience of designerly ways flows through organisational management; afterwards, via an evaluation (audit), the organisation reconfigures its organisational infrastructure to ensure designerly applications underpin subsequent projects. These constant flows create the organisation's own designerly cultural umbrella through patronage. Under this umbrella, designerly ways are dispersed throughout the entire organisation as a cultural entity.

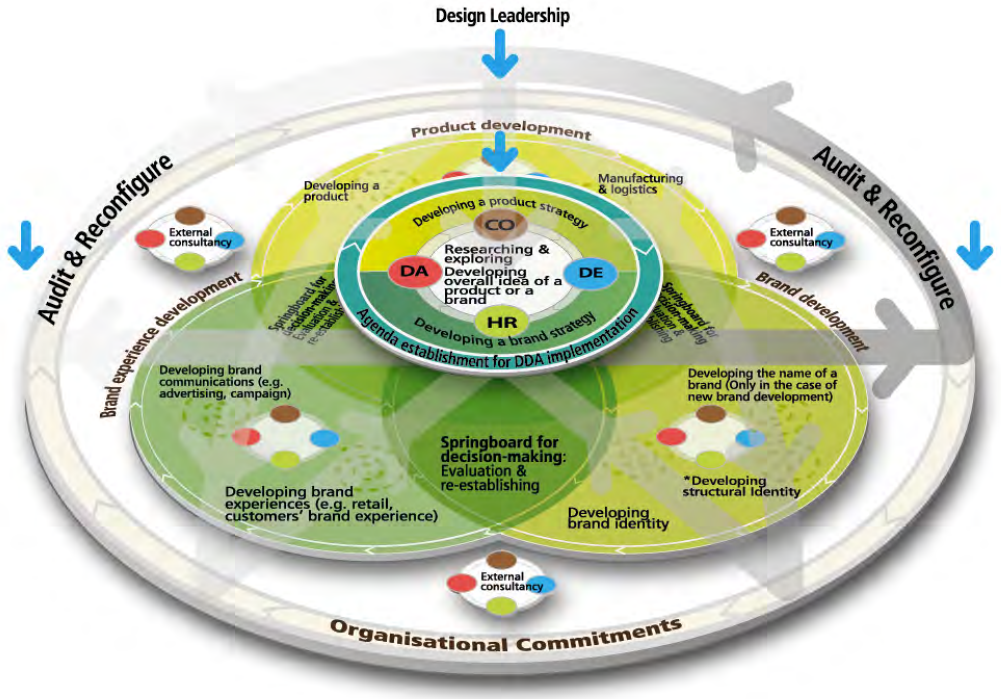

Figure 3. DDA framework for brand development

Design (DDA) leadership: DDA can be ignited, enhanced and exploited by two different types of design leadership. Leadership for design at strategic level has been identified as a substantial trigger from the literature review (Thomke and Feinberg, 2009; Min and Chung, 2008) and this enables an FMCG organisation to encompass DDA from the primary research. Yet, leadership at the project level has often been neglected in the literature. From the primary research, since each business in an FMCG organisation governs its own brand development, a leader at the project level has a strong impact on the way(s) of DDA within project deployment. Therefore, by combining two types of design leadership, at strategic and project levels, their synergy can be interlocked and amplified. This combination involves robust DDA integration and generates better results for a product, brand or service. Two types of leadership are delineated, as shown below:

- **Design leader at strategic level**: Someone who can access and allocate organisational resources ignites DDA and mobilises the capacity of a DDA infrastructure at strategic level: financial and physical resources, organisational structure and processes, knowledge resources, etc.
- **Design champion at project level**: Someone who can boost the designerly applications in a project needs the capability to integrate designerly applications into the business and to amalgamate different departments and methods. For example, marketers, brand managers and designers; whoever is a project manager needs to play this role in the organisation.

While a design leader at strategic level focuses more on playing a catalyst role to envision DDA employment by employees, a design champion at project levels focuses more on playing the role of facilitator and integrator to accomplish DDA application within a project.

TASK IMPLEMENTATION SCHEMA WITHIN BRAND DEVELOPMENT

While leadership was previously referred to as the role of each primary stakeholder to embark on DDA; next, a way of applying DDA to brand development tasks and engaging with internal and external design team is proposed. In this framework, agenda establishment is a primary phase to determine the following DDA applications within subsequent phases (Figure 4). From the primary research, the silo operation of product and brand development impedes collaboration and results in inconsistency in brand experiences and meanings. If all the tasks in brand development are integrated and exploited in tandem, brand development can lead to better results and thus competitiveness of the brand per se and business when coping with the complexities of operation and finding insights from various layers of customers (Schmidt and Ludlow, 2002; LePla and Parker, 2002).

However, in reality, it is impossible to execute every task simultaneously. Therefore, this framework intends to propose a pragmatic way for collaboration and DDA employment. Tasks are interlocked so that they can be stated together in the ideas generation phase to have the same view on a brand and product: each task can be pared down to converting overall ideas into explicit ideas for implementation and to implementing ideas after completing a previous task. Tasks are represented at two levels of a project. Firstly, it is ensured that all the stakeholders – project manager, board members (decision-makers), persons who conduct every task at the second level – have to participate in agenda establishment at the first level in order to contribute their knowledge and have the same understanding of a project: product development, brand development and brand experience development. Afterward, secondly, the stakeholders who participate in an agenda establishment session can then guide each task to keep on the right track of the agenda previously developed. Stakeholders at the second level can be from an internal or external team so that a project manager stimulates them to be incorporated with the agenda development.

Tasks in the same circle are more interlocked than other tasks within other circles, so that subordinated tasks in the same circle are developed in tandem and call for vigorous interaction; but also, all the tasks in the implementation phase are interrelated to each other so that collaboration between these tasks is also ensured. This framework proposes a pragmatic way for collaboration at each level: while agenda establishment at the first level calls for robust collaboration, collaboration via a springboard in the decision-making phase is justified to facilitate implementing each task. This intends to consolidate the up-front stage – ideas exploration and generation, despite the importance of this phase.

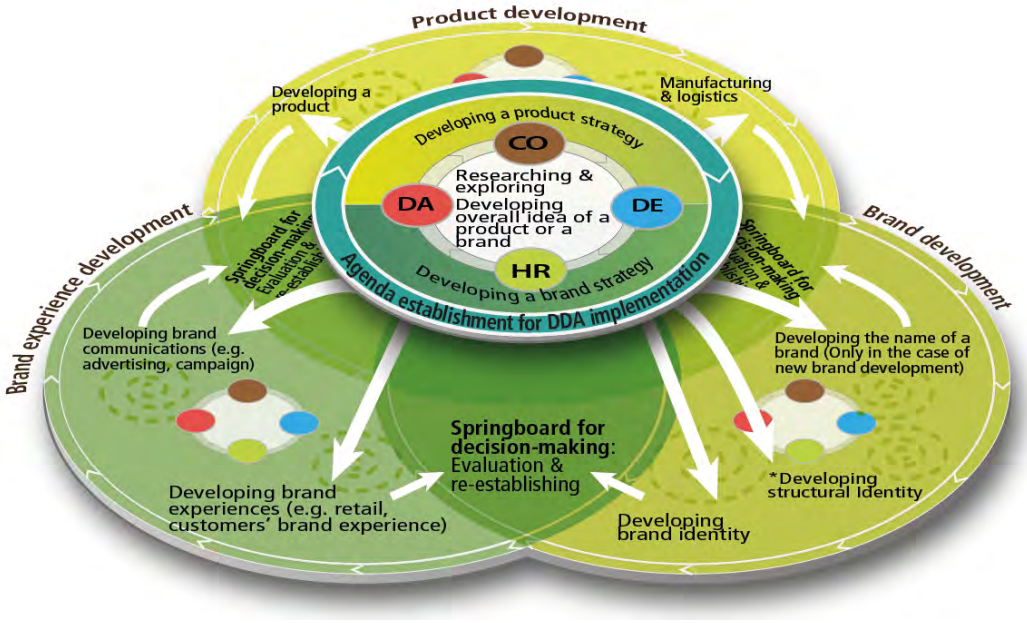

Figure 4. DDA usage and tasks deployment in a project: a focal view of the DDA framework for brand development

Agenda establishment for DDA implementation: This phase involves finding ideas for a project and setting the agenda for product development and for different tasks in brand development. Given the nature of FMCG industry, the term "product development" mystifies people with regard to collaboration between corporations and consultancies. While FMCG corporations perceive this term as the development of the contents within the packaging, consultancies perceive it as the development of the structure of a pack (industrial design aspect). In this research, product development means developing the content inside the pack. Depending on the type of project – new brand development, brand revitalisation, etc. – the extent of considering a brand and product will be different. The other important point is that this phase leads to DDA knowledge transfer to the following tasks in a collaborative manner. In a way, this phase develops a direction for the subsequent implementation phases, as well as the transfer of designerly knowledge and its benefits via robust collaboration. Hence, in this phase, the project manager or design champion needs to facilitate designerly applications (methods) for better ideas and DDA transfer.

The following need to be incorporated into this phase:

- More lead time to engage with customers and to utilise diverse designerly applications in terms of customers insights and visualisation/prototyping, etc.;
- Flexibility and iteration to be assured to underpin designerly thinking: ensure a divergent thinking process;
- Ensure the design champion has access to intellectual and physical resources across departments;
- Involve internal and external stakeholders who take part in subsequent implement phases in a collaborative and integrative manner;
- Engage with experienced specialists from external networks who are often neglected in this phase.

Implementation phase(s): Responding to the previous agenda establishment for DDA implementation, different tasks are exploited in each overarching group: product development, brand development and brand experience development. The details of these groups are as follows:

- **Product development**: Two tasks – developing a product and manufacturing/logistics development – fall into this category. Depending on the extent of brand revitalisation, the product development task is sometimes skipped: reinvigorating the outlook of a brand.

- **Brand development**: Three tasks – developing a visual identity, structural identity, and the name of a brand – fall into this category. Depending on the project type, the extent of tasks is different. Mostly, except for new brand development or some line extension projects, the naming task is often disregarded. On the other hand, brand visual identity development is mostly conducted in every brand development project.
- **Brand experience development**: Two tasks – developing brand communications and brand experiences – fall into this category. The first one relates to ways of communicating a brand to customers (e.g. printing, advertising, blogs, etc.) and the latter is a matter of brand experience during customer purchasing (stock display, POP (Point of Purchase), online shopping, etc.). The latter is often neglected because the FMCG industry is rarely able to control the retail environment and because of a lack of new channels for sales. However, the moment of purchasing decision occurs when a customer confronts a brand on the shelf or online. Thus, the organisation needs to include this task in brand development and consider from agenda establishment stage.

Ideally, all the tasks in the same category (denoted within each circle in the figures) are conducted in tandem whilst collaborating each other. Between/within tasks, features of the four themes – designerly application, design endorsement, collaboration and human resources – need to intermingle along with flexibility and iteration.

Springboard for decision-making: Two activities are highlighted in this phase: evaluation of progress and re-establishing the agenda. The stage-gate process is criticised in terms of integrated and holistic brand development, but it is inevitable in a corporation's operational management as getting bigger. Thus, this framework seeks to minimise the deficiencies of the stage-gate process in order to elevate DDA by justifying a gatekeeper role. This phase does not seek to terminate a project but to help it by offering a reference point with an inclusive view. The springboard for decision-making calls for different milestones for the implementation phases: 1) within a specific task phase, 2) within the overarching development process. Between these two levels, decisions inform each level and the design leader and champion supplement and reconfigure the direction for development and resources.

- **Within a specific task phase:** Scheduling adjustments to decision-making is more flexible because much fewer stakeholders are involved and they can easily reach agreement over changes to the schedule. Decisions are made in response to the demands for implementation deployment between stakeholders at the project level.
- **Within the overarching development process (three category circles)**: Key stakeholders at the strategic level are involved and seek to give consolidated opinions about a task, which are integrated with other implementation phases. In this decision-making, it is vital to check whether all forms of delivery are incorporated into consistent brand touch-points. Meanwhile, mostly budget and strategic resources are determined in this phase.

Role of designers/design team in brand development: Within the framework, the role of design (designerly application) needs to be assured in terms of design integration across all tasks by a corporation leader. In particular, except for big global corporations, there is no internal design team and the designer's involvement is limited to external consultancies' work. Hence, if the design leadership cannot assign an internal design team, they have to be sure to facilitate external consultancies to be involved in the up-front stage (agenda establishment phase).

- **Internal design team (designers):** An internal design team needs to integrate designerly applications into the agenda establishment and implementation phases. Simultaneously, they input their designerly knowledge into the collaboration flow to let an organisation experience designerly applications. If corporations have an internal team, they also need to stimulate their internal design team to contribute to DDA corporate culture establishment.

- **External consultancies**: External consultancies need to act as satellites to the corporation and transfer their specialties and expertise through good relationships. These enable consultancies to observe what and clients do and how, and to engage with clients' projects. Consultancies' involvement is too vulnerable, depending on corporation and project conditions (attitudes to external collaboration, project budget, timeframe, etc.). Nevertheless, corporations need to involve consultancies in the brand development process in order to envisage the benefits of employing DDA and to encourage the undertaking of DDA through casual dialogues, workshops, delivery, strategy planning, etc.

Organisational commitment: After completing a project, an organisation conducts an audit to determine whether the commitment to the four DDA themes interplays well and then how this needs to be reformed to invigorate designerly applications within subsequent projects. Such organisational actions are a way to foster DDA but, depending on organisational characteristics, organisations will have different capability of undertaking designerly actions. Hence, each corporation seeks to employ its own degree of commitment by understanding the corporate situation from a designerly viewpoint.

CONTRIBUTION TO THE FIELD

As shown in the overall findings, design is not yet integrated into organisational activities within the FMCG industry; furthermore, design confronts difficulties when attempting to be integrated into brand development. The FMCG industry has a propensity to continue with the status quo and to allocate the same resources and initiatives to the development process and organisational management: a case of *if it ain't broke, don't fix it!* Therefore, the FMCG industry is caught up in a vicious cycle of poor design/DDA integration. However, respondents noted that it is possible for the FMCG industry to break away from this status quo by offering employees a situation whereby they can experience DDA.

This framework delineates the fundamental key elements to build collaborative projects and disseminate DDA across the organisation. Most of all, this framework emphases collaboration between tasks and in particular in the up-front stages of FMCG brand development. For example, a springboard for decision-making can be configured to ensure integration and collaboration between tasks, and agenda establishment for DDA implementation to fortify the collaboration between diverse stakeholders in the up-front stage, which is often neglected within brand development. In addition, this framework notes the commitment of key stakeholders: leaders at strategic and project levels, and internal and external designers. All need to play a pivotal role by starting to form the infrastructure for DDA and elevating the usage of designerly applications. Most of all, a project which adopts these elements calls for recursion and, via this, repetition, so that DDA can accumulate and be enabled to accomplish an objective, so that an organisation inherits DDA as a cultural entity.

Through member-checking, overall, this framework and other elements to form organisational support are consistent with proposing ways for DDA enhancement in the FMCG industry. In detail, it is substantiated that this framework is appropriate for the FMCG industry in order to establish an environment for DDA.

IMPLICATIONS FOR THEORY AND PRACTICE

Based on a series of research activities, this framework implies a fundamental frame to underpin DDA with activity-based and relational perspectives. Despite that, depending on openness, recognition of cultural change for DDA and a willingness to accommodate DDA, the participants' responses to the DDA framework alter. It was also found that their different ways of understanding design influences the responses to DDA during the interviews. Hence, it might be necessary to calibrate this framework for appropriate DDA promotion, depending on the audience. More importantly, a project within this framework cannot achieve a designerly entity; instead, a project

needs to recur to achieve design-led culture via this framework. Above all, the commitment of a leader at strategic and project levels to comply with the framework is essential.

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Mauricy Alves da MOTTA FILHO (2012). *The Brand Experience Manual: Addressing The Gap Between Brand Strategy And New Service Development.*

THE BRAND EXPERIENCE MANUAL: ADDRESSING THE GAP BETWEEN BRAND STRATEGY AND NEW SERVICE DEVELOPMENT

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Customer experience has now become a central arena for competition in services. Companies are working hard not only to develop memorable customer experience, but also to infuse those with brand associations. To be able to transformation brand strategy into a service concept capable of delivering a brand-aligned experience, the NSD teams needs proper brand input. Nevertheless, literature and practice suggest that current brand manuals do not address properly the needs of NSD teams working with service experiences. For such, this paper proposes the concept of brand experience manual as a way to bridge the gap between brand strategy and the NSD teams, while understanding the status of current brand manuals and how would a proper brand manual for the NSD process be.

Keywords: Brand; experience; new service development

INTRODUCTION

The increasing importance of the customer experience for business offerings has been properly covered in academic literature (e.g. Carbone and Haeckel, 1994, Pine and Gilmore, 1998, Pullman and Gross, 2004, Berry, Wall and Carbone, 2006, Zomerdijk and Voss, 2010). Although in it`s initial stage, experience was understood by some authors as a staged hedonic offering from the service provider to the customer (Pine and Gilmore, 1998), another approaches that understood experiences as the individual perception from a service interaction established itself as the consensus in academic literature (Carbone and Haeckel, 1994, Berry et al., 2006).

It is now understood that one company cannot create an experience, but only the requirements that enable the customer to have an experience (Zomerdijk and Voss, 2010). For such, the company must develop the prerequisites that will render the experience. This is done through the semantic transformation process (Karjalainen, 2004) during the new service development (Clatworthy, 2012), where the brand strategy is translated into service touch-points that will render experiences for the customer.

The new service development process (NSD) 'refers to the overall process of developing a new service' (Johnson, Menor, Roth and Chase, 1999) and can be understood as comprising a planning and an execution phase. In the first phase, also know as the front-end, the service concept is developed. The service concept defines the experience the new offering is trying to deliver, and it will guide the execution phase, the design of the service development system, in

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creating the service process and the service system (Edvardson and Olsson, 1996, Johnson et al., 1999, Goldstein, Johnston, Duffy and Rao, 2002).

Therefore, for an adequate development of a brand-aligned experience, the brand strategy should guide the NSD process in developing a service concept that will be able to communicate the brand proposition (Clatwothy, 2012), and for such, the teams dealing with the design of the service concept need proper brand input. In this context, it would be expected that brand manuals would be the bridges between brand strategy and the NSD teams, however, as Kapferer (2011) notes, current brand manuals are mostly graphic identity bibles, and while they might have some use, they do not address the needs of the NSD teams working with service experiences.

To address this gap between the NSD teams needs and the current brand manuals, this paper proposes the concept of the brand experience manual. For such, an exploratory research based on an extensive literature review on the topics of brand, experience and new service development; and interviews with practitioners from the field of service design and branding was conducted. The following section will introduce concepts relevant to this research and will be concluded by a discussion on the current status of brand manuals and the NSD team needs in term of brand input that points towards solution to the researched problem.

BRANDING

There are not many definitions of branding in the literature. Generally it is understood by it`s grammatical meaning as the process of making a brand. This understanding opens space for a debate on the double meaning of the word, brandings as creating the brand identity (Aaker and Joachimsthaler, 2000), or as delivering it to the customer through brand manifestations (Semprini, 2006).

De Chernatony (2010) defines brands from a service perspective as ‘a cluster of functional and emotional values that enable promises to be made about unique and welcomed experiences’. This might represent an extra issue for service brands, as many times, the service offerings shares the same name and brand with the corporation (McDonald, de Chernanoty and Harris, 2001); and since building a corporate brand from the scratch is not much of an option for an already functional corporation, it is more realistic to include new services under the established corporate brand. This also raises issues related to alignment between brand and corporate values.

Berry et al. (2006) suggest that service branding starts inside the corporation, and it is not about advertising the brand, but defining its core values and designing services that communicate the brand proposition. Since there always is an experience resulting from a service interaction, the company must manage those properly, to communicate the brand proposal adequately (Berry et al., 2006, Clatworthy, 2012).

At a broad level, any marketing action creates impressions on the customers, and these impressions help to form the basis for the brand evaluation (Fournier, 1998). Ducan and Moriarty (2006) suggests that in the service dominant logic, the brand message is delivered by the brand`s touch-points, which are created when the customer or stakeholder is exposed to some brand manifestation. Since service brands have many touch points (Berry et. al., 2006), they must be managed in a way to deliver a clear message.

Branding can thus be understood as the process of communicating the brand`s proposition (brand identity) through multiple touch-points, acting as the interface between the customer and the company. This is done by translating the brand propositions into touch-points, and when done to perfection, the consumer`s perception of the brand is the same as the brand`s proposition (de Chernatony, Riley, 1998). Thus, to enable the translation process, and deliver the brand promise, a brand-oriented company needs a well-structured brand identity (Urde, 1999) that can be helpful in the development of brand-aligned experiences.

EXPERIENCE

Lately, 'products and services, and even commodities are increasingly branded and marketed by using experiences' (Brakus, Schmitt and Zarantonello, 2011:160). Also, under the service-dominant logic perspective services and experiences are increasingly becoming more intertwined (Sandström, Edvardsson, Kristensson and Magnusson, 2008) to a point that services can be understood as the means to provide experiences, and value for the customer: 'value is the evaluation of the service experience' (Sandström et al 2008:120).

Although some academic literature is available (e.g. Brakus, Schmitt and Zarantonello, 2009, Brakus et al., 2011, Clatworthy, 2012), the link between brand and experience still need further development. Brakus et al., (2009:53) 'conceptualize brand experience as a subjective, internal consumer … and behavioral response evoked by brand-related stimuli'.

Experience has been generally understood as the overall outcome of a series of as emotional and personal sub-experience resulting from an interaction with elements created by the service provider (Pullman and Gross, 2004, Berry et al. 2006, Zomerdijk and Voss, 2010). 'An experience is thus essentially a private event that occurs in response o some kind of stimulus' (Brakus et al., 2011:161). However, Pine and Gilmore (1998) present a different perspective, one that is focused on the performance, or the staging act, and not the outcome.

The differences between these perspectives arise from the fact that one focus on experience from a psychological perspective (Sandström et al., 2008), while the other understands experience as an external agent. Pine and Gilmore`s (1998) work has a strong bent towards a hedonic meaning of the experience word, however Sandström et al. (2008) and Johnston and Kong (2011) suggest that experiences can happen to in any type of offering, and not only in entertaining ones, for from any interaction an experience emerges (Berry, Carbone and Haeckel, 2002). 'An experience occurs when a customer has any sensation or acquires knowledge from some level of interaction with the elements of a context created by a service provider' (Zomerdijk and Voss, 2010:67)

For Carbone and Haeckel (1994:9) experiences result from clues emitted by the product, service, and environment to the customer: 'Performance clues relate to the function of the product or service'; And context clues, those associated with the environment, composed by: humanics clues, related the social interactions; and mechanics clues, the tangible elements of the environment.

From the company perspective, a service is a set of processes, but from the customer point-of-view it is an experience (Johnston and Kong, 2011). Being a personal and emotional outcome from a service interaction, a company cannot provide an experience, but only stage the prerequisites for the service experience (Sandström et al., 2008). Those prerequisites 'typically include the central concept or activity of the experience and the context in which that takes place' (Zomerdijk and Voss, 2010:68).

NEW SERVICE DEVELOP PROCESS

Johnson et al. (1999:5) define New Service Development (NSD) as 'the overall process of developing new service offerings' that 'is concerned with the complete set of stages from idea to launch' (Goldstein et al., 2002:122), being a new service 'an offering not previously available to the customer' (Johnson et al., 1999). Service design, for is turn, is defined as the 'design of experiences tat reach people through many different touch-points, and happen over time' (ServiceDesign.org, 2012).

For Koivisto (2009) and Johnson et al. (1999), service design refers to the first steps of the NSD process, and is concerned with the development of the service concept. The service concept serves as a guide for the NSD process, defines the "what" of the new service and guides the service delivery system design into implementing the "how" (Goldstein et al., 2002). For Edvardsson and Olsson (1996), the service concepts details what will be offered to the customer

and how it will be implemented, for them, a company cannot design a service, but only the prerequisite for its delivery.

Thus, the service concept will guide the development of the service delivery system (Goldstein et al., 2002), which can be understood as comprehending the service processes and the service system. The service process is the prototype of the procedures performed to delivery the service to the customer, and service system constitutes the resources required for realizing the service concept (Edvardson and Olsson, 1996).

Goldstein et al. (2002) noticed that the link between business strategy and service design is weak. For Carbone and Haeckel (1994) the design of the proposed experience has to relate to the business strategy, as agrees Edvardson and Olsson (1996) and Sandström et al. (2008). In this paper, it is proposed that a brand orientation in the NSD process can strength the link between business strategy and service design, as the importance of the alignment between brand and business strategy has already been consistently covered in branding literature (Aaker and Joachimsthaler, 2000).

It is the role of the NSD teams to transform brand strategy into a service concept (Clatworthy, 2012). For such, they should engage in a semantic transformation (Karjalainen, 2004), a process based on Peirce`s semiotics (Santaella, 2008) where the brand`s manifestation stands for the brand identity to the customer. In other words, it gives “shape” to the brand strategy.

It is in the early stages of the NSD process that service concept is developed and most of the decisions are made (Clatworthy, 2012). In this sense, accurate brand input at this stage should guide the service design process in developing a service concept aligned to the brand strategy. Since the service delivery system (Goldstein et al., 2002) is developed to enable the service concept (Edvardsson and Olsson, 1996), it could be expected that infusing brand knowledge in the early stages of the NSD process would provide brand-aligned service experiences.

RESEARCH METHOD

The data collection process was done through semi-structures qualitative interviews, which focused on the informant`s perspectives and knowledge. The use of such a method was appropriate for allowing freedom on the question formulation facilitating further exploration of particular facets of each interviewee (Hopf, 2008). In the context of this paper, which aims to understand empirical reality and develop new solutions for the research problem, this flexibility was essential for the process.

The interviews took place between May and July of 2012, and where conducted personally in 7 occasions, and through videoconference in other 6 occasions. Interviews ranged from 30 to 120 minutes and the interviewees were from brand agencies (5) and service design consultancies (8), from 5 different countries (Brazil (4), France (1), Italy (4), Netherlands (2), Norway (2)). The format of the collected data includes the recorded interviews and field notes.

Due to time pressure, only 7 of the interviews were transcribed, while the other 6 had to be analyzed thought the field notes and summaries taken from listening to the recordings. The data was analyzed through qualitative content analysis, considering the communicational context and the latent meanings. The material was then summarized by an inductive category formation leading to more manageable findings (Mayring, 2008). In the following section the findings are presented and discussed.

FINDINGS

As a consequence of the methodological approach taken, the findings were intertwined with discussions. Many of the insights presented here are the result of the discussions with

interviewees. Since for this paper the reflections and developments from findings are more important than the findings themselves, those will be presented together in this section.

CURRENT BRAND MANUALS

The inadequateness of brand manuals noticed by Kapferer (2011) has been confirmed in the empirical studies. Interviewees mentioned that brand manuals are too broad and imprecise, not describing the brand experience properly, and therefore not very usable for new service development (NSD) processes focused on service experience. Some interviewees also mentioned that current brand manuals reflect an old mind-set, inherited from past decades, and are created for communication agencies, focusing in controlling the visual communication. 'It is still very much about a bunch of guidelines on how to use notions. So it is how to apply a visual identity more than branding bible' (Interviewee C).

Brand experiences are the personal outcome evoked by a brand stimuli (Brakus et al., 2008), hence one cannot design an experience, but only for experiences (Pullman and Gross, 2004). Designing for brand experience requires a specific sort of brand input, one that focuses on the delivery of the brand values proposition and not only in communicating it. The brand input should also deal with the dynamic nature of the service brand: its multiple touch-points and evolving character of the brand.

> *… brands evolve also, so this is probably what makes the whole experience complicated to keep it alive and meaningful. Because we changes people. Right? We change and if my assumption is the brands are made of people internally and outside of the company, with all the complex relationships, people change, we change, the environment change so brands are in constant change and that is probably hard to, to keep alive in a meaningful way. (Interviewee F)*

The findings suggest that current brand manuals are broad because they are made for agencies, and do not focus in delivering service experience, but just communicating it: '… branding is sort of owned and claimed by people who are not in the business of creating new stuff. They are in the business of talking about stuff' (Interviewee E). Interviewee C observed that the role of these brand manuals is to control the brands visual expressions, and not to propose settings to deliver service experience:

> *Most of the brand guidelines that we create as well are for the agencies… so we create pretty detailed manuals with examples of how this could look like, so we insure that the space, the capacity of then doing something wrong is limited… things like tone of voice, often we describe a little bit in the brand manual, but not enough, at all. And the experience, what kind of experience we want our customers to feel, I don't think I`ve seem any brand manual where it is described very well… (Interviewee C)*

It was also noticed through the interviews that corporate values are not properly aligned with brand values. This can be especially harmful for companies trying to develop service experiences because corporate commitment is key for services. For goods, production and consumption are separated, while in service, most of the time they are simultaneous. Also, services have multiple touch-points, and keeping then aligned with the brand proposition might be complicated without a brand culture.

As interviewee H noticed, 'branding, many times happens within the marketing department, but the whole thinking, the whole strategic thinking, is not really spread within the whole company'. To properly delivery service experience, all the touch-points should be aligned, and the people within the corporation should be feeling like they are part of it.

> *It is not just communicating the ideas that the genius designers, or the genius director developed for the branding of the company. People need to feel that too. They need to relate to that. And the best way to do that is making them as co-creators of the process. (Interviewee H)*

The disjunction between brand and corporate values, the lack of brand culture within the corporation, the communication focus of brand manuals and it`s inadequateness for service design seem to have the same origin. They are all inherited from product-dominant mind-set, where production was clearly separated from consumption, brand building was a role reserved to the communication department, and therefore instigating a brand culture within the company didn't really make much sense.

THE EVOLUTION OF BRANDING

Semprini (2006) noticed that advertisement as early as the 1980s broke free from the functional offering, focusing in creating "wonder worlds" that contributed to the debate of the role of the brand and product in the communication. At this stage, brands started to lose connection with the offering, becaming a 'pure advertising phenomenon' (Semprini, 2006:31)

As interviewee A noticed: 'advertisement and marketing hijacked the value proposition and kind of took the value proposition to a place that wasn't real, that the company couldn't really deliver it anymore'.

By the 2000s the battle between brand and product was already over, with brand being victorious. The old marketing mix centred in the product would be replaced by one focused in the brand, and the marketing mix elements becoming manifestations of the brand proposition (Semprini, 2006). Du to the increasing presence of the internet, social medias and the word-of-keyboard the corporation`s started to lose control over their brand`s meanings (Formosa, 2011), encouragement the need to control the brand by the service delivery (de Chernatony, Drury and Segal-Horn, 2003).

> *Because of an increased transparency that is enforced on companies because of internet etc… they can not get away with laying anymore, or cheating. I mean you can get away with, they are getting away with it, but you know, less and less. So … now marketing has to be a conversation and not just a one way street, and the interesting thing is… it is sort of doing. (Interviewee A)*

A NEW BRANDING

In the very influential paper "Evolving to a New Dominant Logic for Marketing" Vargo and Lush (2004) propose a new understanding for value creation process, focusing in the customer perception of the service outcome instead of in the exchange of "goods". In the service dominant mind-set, delivering a brand experience needs the involvement of the whole company, consistency between corporate and brand values, brand alignment across multiple touch-points, and a focus in delivering the brand promise, and not only in communicating it.

In this sense, a new sort of branding is emerging, one that focuses on "doing" and not "saying". Services brand are strongly driven by the customer experience (Berry, 2000). The new branding approach will focus more on disciples like service design than advertisement, since they are more fused in creating experiences and not just communicating then. Above all, the new branding points towards the emergence of a new mind-set, that is integrative in it`s nature, and consider all the possible touch-points as manifestations of the brand.

> *Well branding and service design I think, as with most ideas, expertise… methods, everything is going merge. So branding… because sometimes it feels like, you understand branding, so like marketing, communications or advertising, and then you have branding. I think all that kind of needs to be revised, needs to be, all those words,*

you know, are meaningless... again these are just words that are symbolizing a need for something else, a new approach, a new mind-set. (Interviewee A)

CORPORATE ISSUES

The need to work on corporate issues within the company was almost unanimous among interviewees. The acknowledgment of branding as a holistic concept depends not only on the corporation you working for, but also on the contact person you are dealing with. Most of the interviewees mentioned that working with people with in a higher management level was important to nurture corporate commitment. Interviewee T exemplifies this through a comparison of two projects he was involved in:

Company A was very open and flexible and (had) not much strategy as such, so it is a bit hard to have a process like that. Company B has done much more base work, and has the propositions and the statements and the values and everything (Interviewee T)

As mentioned, the corporate contact also plays an important role in the process, Interviewee H suggests that 'you really need to work first the mind of the person who is hiring you', 'higher management have, generally speaking, broader vision and understand the role of the brand' (Interviewee P). Also, another reason why consultancies and brand agencies prefer to work with higher management is that they need power to influence the corporation in doing a proper branding process:

That is why you need to get into a really higher level, because then you can make the client understand what they probably need to do. Because if you (are) not getting high enough, or get enough influence on them, you might not be able to do what they need and you might have to do what they want, which may not be as successful in the long run. (Interviewee T)

It is also appropriate to revisit the issue of the lack of alignment between corporate and brand values in developing a brand culture. Once you created two separated set of values, one for the external world and the other for the internal corporation, delivering a brand-aligned experience gets more complicated. As McDonald et al. (2001) suggests, since service brands are mainly built by experiences and not by communication, internal branding becomes very important, because brand are as intangible for the employees as they are for the customer (Berry, 2000).

… internal communications, external communications… the way will you communicate (to) your employees and the way you communicate to your customers… These were two different worlds, so you could have for instance a different tone of voice, a different style, different colours, different topography you know… completely different communication internally than you had externally. (Interviewee A)

Stompff (2008) has shown that once the brand values are really internalized by the culture, the new offerings will consequently be brand-oriented (Stompff, 2008). As Interviewee P explains by giving the example of the consultancy where he works, companies should engage in internal marketing to involve the staff in the brand culture.

For example, Consultancy X does that for Consultancy X people, so we feel part of something that has a goal. So, the result of that is that we deliver better work to our clients and that everywhere Consultancy X has an office you find more or less the same mind-set. And that's not because they play the pendulum trick on us, but because their business strategy is relevant and everyday they try to give employees the tools and what is needed to deliver, and understand where we are going as a company. (Interviewee P)

THE CURRENT NEW SERVICE DEVELOPMENT PROCESS

Due to the lack of brand input, and the need to understand organizational issues, the design agencies need to go inside the corporations to understand their processes and grasp the brand identity, going many time through a process of semantic decoding (the reverse process of semantic transformation (Karjalainen, 2004)), grasping the brand`s values through its manifestations inside and outside the corporation.

> *It is about understanding whatever exists within a company and giving it a sense, fill in the gaps, sometimes it is a question of distilling what it really means, and you can do it as a professional, you can do the different tools, you can do it by asking people, internally and externally, different stakeholders etc., what resonates, what is important, relevant for all the people and build the brand around it. (Interviewee F)*

As a consequence of this process, the brand identity may end up dissolved, and lose its original meaning. Although some consultancies try to share their understanding of the brand values with other ones, minimizing the variations across different touchpoints, this decoding process can be harmful for the brand image, generating a lack of alignment in the brand`s manifestations.

> *That is exactly the reason why it is so important that company start realizing that they need to frame their brand in a way that each kind of agencies can work with this. Cause if they don't, the agencies will start to play around with the brand themselves and you get all different fragmented interpretations. (Interviewee E)*

Also, due to the lack of a proper brand leadership within the company, the brand values might be forgotten and new projects are done with a myopic understanding of what the brand stands for, or became too customer focused, losing track of the original proposition, which is not adequate, for in a brand-oriented company, the customer`s needs are fulfilled within the brand framework (Urde, 1999).

> *I think that (the "lost" of the brand identity concept) happens all the time, they forget their own brand, and new people came in and people go out, and things are evolving all the time, and a lot of people work with only one or very few touch-points: I work in sales, I work in Marketing, I work in IT, or whatever, and they don't have a real relationship with the brand in their daily work, which means when they create new stuff, whatever it is new touch-points or new services, they kind of do what they think is best without looking back at the DNA. (Interviewee C)*

BRAND EXPERIENCE MANUAL

The problems related to the lack of adequate brand input for the NSD teams developing service experiences are associated with two main causes: the inadequateness of brand manuals and corporate culture issues. While dealing with corporate culture may produce a more effective result, it is much more challenging, complicated and costly than reframing the brand manuals. In this sense, this paper proposes the concept of brand experience manual as an approach to communicating the brand strategy to the NSD and internal teams that focus on defining what is the experience the brand is trying to deliver as a way to tackle the problem of inadequate brand input in the development of brand-aligned service experiences.

While dealing directly with corporate issues is out of the scope of a regular brand manual, the importance of the subject pressures the brand experience manual to tackle corporate issue indirectly. An opportunity for that may arise from understanding employee as an internal customer, and exploit on the role of internal marketing in building a brand culture within the organization. Since the development of brand culture needs to be nurtured, the brand experience manual could promote it by including suggestions of internal marketing actions that could communicating the

brand values to the staff through motivational posters, for example. This would also help to tackle another problem, through the development internal marketing based on the brand experience manual, the values communicated internally and external would be the same, reducing the gap between corporate and brand values.

A brand experience manual is just a medium for communicating the brand essence. Before that, a whole process must be done to actually understand what the brand stands for, what are their values and what is the experience it wants to create. To be able to deliver an adequate brand experience, it is essential that the business strategy and the brand`s proposition are aligned. As such, in the brand development process, a brand experience approach would help aligning the brand values with the business strategy.

Relating to the NSD team needs in the development of a brand-aligned service experience, a brand experience manual should tackle multiple factors. It should communicate the brand proposition, take visual identity just a manifestation of the brand`s values, deal with multiple-touch points and tackle the issue of the evolving character of the brand. Stating clearly what is the brand experience the brand wants to deliver and what are the brand values might seems as simple solutions. Although it might seem easier said than done, it is a feasible and relatively cheap process to achieve an effectively brand-alignment in the new service experiences. By doing this, such a brand experience manual would give freedom to the NSD teams to communicate more properly to new audiences, while still developing brand-aligned experiences.

As Meroni and Sangiorgi (2011) suggests, one of the roles of the design team is to translate the brand values to new cultural contexts, facilitating the development of what Shillum (2011) calls brand patterns, a process that focus on coherence and not consistency. In this context, it seems that the role of a brand experience is much more about giving freedom to the brand to adequately communicate its values, than it is to restrict it.

CONCLUSION

The previous sections presented the current state of brand manuals, and explained why they are inadequate for the NSD team needs and the development of brand-aligned experiences. The emergence of a new branding approach that focuses on delivering the brand experience through service design, instead of focusing on communication has also been observed. Another relevant finding this research was faced with was the importance of the corporate culture to the NSD process, and the role of the brand culture in the development of service experience.

This paper presents an exploratory research done through a series of interviews and literature review, It is not the purpose here to validate if the problems faced by the interviewees are generalizable, but to extend the knowledge and understanding of the link between branding and experience in the NSD process. The concept and a general approach for the brand experience manual were presented, although further work is needed in the development of its content and adequate format.

Implications for practice include a suggestion for stronger focus on defining what is the experience the brand is trying to deliver to the customer. In this sense, understanding the employees as internal customers may help in creating a brand culture within the organization. For theory, this research contributed with an exploration of the reasons of the current state of brand manuals, proposing the service experience manual as a link between brand and experience in the NSD process, and pointing to the need for further studies in branding under the service dominant logic.

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Claus NOPPENEY, Nada ENDRISSAT and Robert LZICAR (2012). *Consistent, Authentic & Emotional: Design-based innovation in Artistic Perfumery*

CONSISTENT, AUTHENTIC & EMOTIONAL: DESIGN-BASED INNOVATION IN ARTISTIC PERFUMERY

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This paper examines an innovative and design-based product development process in artistic perfumery. This growing segment of artistic perfumery is known for innovative designs and concepts. In this context is a design agency that has developed an alternative design-based approach to developing perfumes. What turns out to be driving this process is a strong sense for aesthetic consistency, a passion for authenticity and an unusual presence of an emotional dimension throughout the process.

Keywords: innovation; artistic perfumery; design practices

INTRODUCTION

This paper tells the unusual story of a design inspired product development process in the field of artistic perfumery. This growing sector in perfumery reinvents the traditions of artistry and creativity that characterized perfumery until the rise of global brands. Henceforth, new perfumes are developed according to a commercial logic determined by market research, evaluation boards and data analysis (Burr, 2008; Calkin & Jellinek, 1994; Jellinek, 1991). However, the limits of this approach are increasingly recognized: A “tyranny of sameness” (Dixit, 2009) dominates the market and even new scents launched by major brands fade away within a few months despite tremendous marketing efforts.

In this context the label Humiecki & Graef stands out with an innovative approach. The label was created by two designers who wanted to work beyond the constraints of their client projects. At the beginning of the development of a new fragrance one of the designers develops a visual concept that expresses a specific human emotion. Subsequently, the concept serves as a brief for all creative processes (scent development, packaging design, campaign photography, product name and campaign text). This approach is different in so far as a design concept instead of market or branding considerations motivates and informs the entire process. A closer analysis of the case reveals that the approach taken is deeply rooted in their ‘design attitude’ (Michlewski, 2008) and their ‘design practices’ (Kimbell, 2011). Accordingly, we identified a remarkable sense of consistency, authenticity and emotion that permeates the entire process leading to the creation of a new fragrance.

Thus, in the context of design management and the theme of the conference ‘Leading innovation through design’ our paper aims at two contributions: It presents rich qualitative data

from a design-based innovation process that is deeply intertwined with material practices. In this respect we contribute to a theory of design practice that goes beyond a popular design thinking practice. Accordingly design thinking as a theory of what designers actually do cannot be reduced to cognitive processes of designers (Tonkinswise, 2011). We also show how design practice impacts on the overall quality of the innovation. From a design management perspective innovation is at the core of the business relevance of design. However, our discussion of the case aims at innovative aspects different from changing the emotional meaning for customers as discussed in the context of design driven innovation (Verganti, 2009).

This paper is part of a larger study on the role of objects in artistic perfumery. In this context we have been able to closely follow the development of the eighth and ninth perfume for Humiecki & Graef. This paper draws on data collected during both development cycles.

The remainder of the paper is organized as follows: We start by briefly reviewing the existing literature on design thinking and design driven innovation. In the following section we describe the current landscape of the perfumery sector. Subsequently, we introduce the field of artistic perfumery and our research context at Humiecki & Gaef. Following the methods section we present our results. In particular, we show how a strong sense for aesthetic consistency, a passion for authenticity and an unusual presence of an emotional dimension impacts on the overall process. The paper concludes with a set of consequences derived from this case.

DESIGN THINKING & DESIGN DRIVEN INNOVATION

From a design management perspective innovation is at the core of the business relevance of design. Traditionally, design has been described as contributing to a ‘differentiation of the form, which has an impact on consumer behavior’ (Borja de Mozota, 2003). More recently, the literature on design thinking advocated design as a problem solving approach beyond disciplinary boundaries (Dorst, 2011). Accordingly, design professionals make use of a reasoning that evades the common dichotomy of inductive and deductive approaches. This abductive reasoning emphasizes the development of good alternatives (Boland & Collopy, 2004): ‘design thinking deals primarily with what does not yet exist’ (Liedtka, 2000). It is this passion for the new and unknown that accounts for the popularity of design thinking in current management discourse (T. Brown, 2009; Martin, 2009).

However, design thinking is increasingly criticized from within the design field. Accordingly, design thinking reduces design to an immaterial, intellectual problem solving technique (Kimbell, 2009). In fact, It is described as ‘design minus the material practice’ that downplays the primacy of aesthetics in designing (Tonkinswise, 2011).

It is this aspect of design as material practices that this paper wants to strengthen with respect to its relevance for design based innovation. We want to show that designing can hardly be reduced to a cognitive process. The term ‘design thinking’ appeals to an essential notion of design. Accordingly, design thinking is what lies at the core of design activities irrespective of the multiplicitiy of design disciplines (e.g. architecture, communication design, fashion design etc.). Thus, our case wants to bring back design work and practice.

In addition to the design thinking literature the strong links between design and innovation are also recognized and evidenced in the discussion on design driven innovation (Verganti, 2006, 2009). Design-driven innovation aims at changing the emotional meaning of products. It focuses on product generation and provides specific methods to be followed. However, given the prominence and the visibility of this discussion there is a tendency to identify all types of innovation related to design with this specific type of design driven innovation. In this respect, our case illustrates how the conference theme ‘leading innovation through design’ relates to a theory of design practice. The case from the field of artistic perfumery shows how leading innovation through design can be different from a mere market driven innovation approach.

PERFUMERY: FROM ART TO COMMERCE

Perfumery is one of the largest luxury sectors (Chevalier, 2008). It implies developing and selling standardized products in large quantities at low unit prices. Reactions to perfumes are to a large extent subconscious and emotional. Narratives that communicate emotions and sensations in an intimate way dominate the diverse internal as well as the market oriented communication activities (Lampel & Mustafa, 2009). In addition to the olfactory sense, the packaging and advertising appeal to the visual and address broader social implications (Goldman, 1987). Thus, fragrances appeal to aesthetic or expressive tastes.

The fragrance market is dominated by major brands and operators (Kubartz, 2011). All have large advertising budgets. Yet, the risk to fail with a new product is even for a major brand very high despite substantial research efforts. What specifies the industry structure further is the central role of the raw material that is provided by one of the remaining four major producers of flavors and fragrances (Firmenich, Givaudan, IFF, Symrise). It was not until the 1970s that the intuitive decisions of the perfumer were replaced by systematic, quantitative calculus based on consumer research: 'Industry [had] taken over from art' and changed the scope of the perfumer's authority (Ellena, 1991: 345). This rather recent commercialization and professionalization of perfumery sharply contrasts with the traditions of artistry and creativity that used to describe the sector. Accordingly, the perfumer was the acknowledged authority on all aspects regarding a perfume (Jellinek, 1991). Thus, the tension between a tradition of creative freedom and the tough reality of contemporary brand management characterizes the perfumery sector.

Today fragrances are above all efficiently developed along common product development standards (Dixit, 2009). At the beginning of the product development process the brand operator presents the consumer profile to the perfumer. A perfume brief often focuses on a particular target consumer segment and is often portrayed as a confusing statement of obvious incompatibilities and contradictions (Turin, 2007). The perfume brief communicates the idea of the fragrance house to the perfumer and specifies the general scent characteristic by referencing a particular scent family (Burr, 2008; Pybus, 2006). Following this brief the perfumer translates the commercially defined profile into olfactory terms (Butler, 2000; Dixit, 2009a). In addition, design skills are used for the development of the packaging. However, the role of design is rather subordinate compared to branding and marketing competencies.

More and more, it is recognized that this process encourages the imitation of successful competitors, rather than "new" products. Yet, there is a tremendous pressure to innovate and be special. According to a leading industry database more than 1.200 fragrances are annually launched and compete against the 12.000 fragrances listed in the FiFi database (Jeffries, 2011). This is a further increase compared to the 8 launches per week in 2003 (Turin, 2007). Despite sophisticated testing and elaborated launch campaigns for new scents most newcomers fade away within about a year. This prompts the brands to come up with yet another launch (Byron, 2007). All in all, it is this paradoxical coincidence of market forces that characterizes the current situation in the international perfumery market and gives rise to the emerging field of artistic perfumery (Dixit, 2009a, 2009b; Turin, 2007).

The growing segment of artistic perfumery is known for innovative designs and concepts. It sharply contrasts the rather recent commercialization and professionalization of perfumery and revitalizes the traditions of artistry and creativity that used to describe the sector. What is still considered to be a niche category is increasingly discussed as innovating the fragrance industry: 'Once dominated by commercial brand names like Versace, Dolce & Gabbana, Armani and Bulgari, the stagnant Italian beauty market has seen a recent emergence of selective, or niche, specialty fragrances' (Epiro, 2004). The field of artistic perfumery is also on the rise in terms of new fragrances. According to Michael Edwards, a leading industry expert, there were 219 launches in this segmet in 2011 (compared to 9 in 1991) (Jeffries, 2011). All in all there is a consensus that this

field ‘continues to gather steam in a saturated industry heaving with big-budget launches and shaken by the recession’ (Olsen, 2011).

RESEARCH SETTING: HUMIECKI & GRAEF

Within the field of artistic perfumery Humiecki & Graef has been labeled as ‘the new Comme des Garçons’. International perfumery blogs (such as www.basenotes.com; www.cafleurebon.com; www.fragrantica.com) also highlight Humiecki & Graef’s uniqueness. They comment on the longevity and ‘symmetry’ of these fragrances over time and remark that their products smell ‘like nothing else out there’. In fact, Humiecki & Graef conceptually innovates perfumery by organizing its diverse design processes around a ‘basic human emotion’ as its core idea. Each scent is introduced as a scent about a particular emotion. It is ‘is inspired by atypical, emotionally evocative, motifs such as madness, melancholy and fury’ (http://www.humieckiandgraef.com/).

The brand goes back to a first experimental collaboration between the designer Sebastian Fischenich and the internationally renowned perfumer Christophe Laudamiel in 2005. Following a first success the brand was then created by Sebastian Fischenich as a creative director and his partner Tobias Müksch. Both designers jointly run the design agency Belepok based in Cologne and Zurich specializing on the luxury sector. Facing the constraints of commercially driven innovation in mainstream perfumery Humiecki & Graef was created with a sense of design ambition:

> *‘We wanted to demonstrate to our clients that there is a different way. This was the trigger for Humiecki & Graef’ (interview transcript, creative director).*

At a later stage the collaboration was further expanded to the perfumer Christoph Hornetz. Until 2010 seven perfumes were successfully launched on the market.

Central to the development of each scent is a visual concept that is developed in various stages over a period of several weeks or even months. Initially, the creative director clarifies the general emotional idea for the new fragrance. He selects diverse visual elements out of magazines, books and other printed matter and bookmarks the pages. Afterwards, he scans the images and modifies them in an image-processing program. The product, a new image, evolves by overlaying and multiplying the visual material. The concept is completed with a few lines of text that are finally added. The concept is subsequently used in the briefing contacts with the other creative professions involved in the process (e.g. perfume-making, packaging, photography, copywriting).

RESEARCH METHODS

Our data stem from eighteen intensive months of an ethnographic study on the product development process in artistic perfumery. Eckert & Boujut argue that an ethnographic approach is particularly well suited for design processes, because it allows the researcher to capture the complex processes in their uniqueness (Eckert & Boujut, 2003). In order to learn about the design practices of perfume-making and the role of objects we ‘zoomed in’ (Nicolini, 2009) on the micro-practices of the different contributors including their actions, interruptions, timing, comments, talk, music they listened to, emails they wrote or received, as well as their reflections, own interpretations and reasoning for doing things this way or another.

We collected data by participant observation and – whenever possible – video-taped the practices of the creative director and the perfumers in the design office in Zurich (Switzerland) and in the studio of the perfumers in Berlin (Germany) and New York (USA). We taped most of the talk, wrote extensive field notes, took pictures of the objects, the actors, the infrastructure and surroundings (office, laboratory, desk); we also collected various materials and objects (including the concepts, the failed and thrown out prototypes, old excel sheets, notes, music that the designer listened to) and filed the email correspondence between the creative director the perfumers, the packaging designers, the photographer, and text editor. In addition, we carried out open ‘de-

briefing' interviews in which the actors talked about what they were doing and reflected with us on what we had observed. In addition to the creative director, the perfumers, the photographer and the packaging designers, we also interviewed distributers and marketing managers working for the brand.

Following an inductive, qualitative approach we iteratively moved between data collection, analysis and emerging theory (Charmaz, 2006; Corbin & Strauss, 2008). We cycled among multiple readings of the interview transcripts, videotapes, photographs, field notes, coding of recurring themes and the building of categories. The ambiguities resulting from the initial coding were taken up during the formal debriefing interviews and lead to a better understanding of "what is happening" (Charmaz, 2006). In the course of organizing and interpreting the data we drew upon the key concepts developed by Verganti (2009) and Tonkinwise (2011) as sensitizing concepts. What emerged was an understanding of the development of the new scent as leading 'innovation through design'.

RESULTS

The development and launch of a new fragrance involves diverse creative as well as commercial disciplines. However, in our case it was the design that was leading the overall development process. Accordingly, the creative director developed the concept for the new fragrance and coordinated the other creative and commercial professions involved in the process. The designer took all decisions that finally defined the new product. Thus, design was involved in different roles and at different stages in the overall development process. What turned out to be driving this process was a strong sense for aesthetic consistency, a passion for authenticity and an unusual presence of an emotional dimension throughout the process.

CONSISTENCY

Initially, the creative director developed the concept that clarified a specific emotion through a sequence of three visual images. At the very beginning, there was only a mental image (e.g. of a romantic couple that after years met again in the street). Looking through magazines and catalogues, listening to music and skimming through videos the creative director clarified and sharpened this situation.

Working visually on the concept allowed him to elaborate on the consistency of the concept as he explained in a debriefing interview:

> *The concept is consistent as soon as it feels right. And it is only me who can be sure about this. In addition, I also strongly believe that the final product tells you whether the concept was consistent and well balanced – that the concept was clear (transcript).*

Thus, consistency is not only a question of fit between scent, name and packaging. Above all it is a quality of the concept itself. And this internal consistency of the concept impacts on the overall quality of the product.

The idea of consistency also guided the development of the different parts of the final product. Consequently, the concept was not only communicated to the perfumers as a brief but also used for the packaging design. Later on, it also inspired the communication expert working on the campaign text and the photographer creating the campaign photography.

> *There is a common thread in our work. It relates to the strong link to the concept. We understand a product based on its concept – and this truly from the very beginning. This consistency is almost crazy. And then this is even filled into the bottle. This idea of perfumery is shared by very few companies; that there is a concept and then based on*

> *this a scent; and then packaging and communication is created and builds on this. This approach is very rare these days (transcript).*

In the case of the packaging design this sense of aesthetic consistency can be illustrated by comparing the different solutions developed for the different scents. Thus, different materials (e.g. copper, wood, porcelain) resulting from different treatments (e.g. alloy, coating) were identified and selected in accordance with specific concepts. In addition, we could observe this sense of aesthetic consistency when the decision on a material was executed and additional implementation problems (e.g. a lack of precision) occurred. Later on the creative director commented on his decisions and referred to it as dynamic consistency.

> *What does not work is a static concept that is literally used on a one-to-one basis. If there is a brand with a kind of metallic feeling, one could argue that in this case metal is important: the packaging is made of metal; metal dominates the counter in the store; you communicate metal; and in the end you might even have a metallic scent. One might think that this is consistent, because metal serves as a recurring theme. But at the end of the day it is a very static, boring product. It is dead because a character consists of tension (transcript).*

All in all, this sense of aesthetic consistency guided the process at two levels. First, the process focused on the development of a consistent concept. Second, this concept then allowed for the overall consistency of the process.

AUTHENTICITY

Contemporary consumer life becomes increasingly saturated with ‘toxic levels of inauthenticity [that] we’re forced to breathe’ (Gilmore & Pine, 2007: 43). With respect to the perfumery sector this general observation seems to be even more than true.

In our case we frequently came across questions of authenticity. In interviews industry experts often commented on the name of the brand. One fashion journalist for example asked spontaneously the rhetorical question:

> *‘How can one use a name that can hardly be pronounced?’ (transcript).*

In fact, the two designers named the brand after their mothers’ mothers’ true maiden names irrespective of severe marketing concerns. In a debriefing interview the creative director recalled the trade-off situation:

> *I remember how critical our marketing people initially reacted: “The name is too complicated! Isn’t there an easier option? Nobody can pronounce this”. Thus, one tried to erase the character out of the brand. However, we remained stubborn. I cannot name a brand that builds on a concept in a pleasant way only because it might sell better (transcript).*

Thus, the designers’ true grandmothers became part of the brand:

> *The mirror image behind the brand name: designers Sebastian Fischenich and Tobias Mueksch each had a profound formative relationship with a remarkable grandmother, Helena Humiecka z Humiecina (1908-2000) and Katharina Graef (1906-2004). Helena and Katharina’s eventful lives reflect the extreme arc of 20th century history. They were a steady source of love, security, and practical wisdom for their grandsons, and their legacy is self-confidence, the courage to face life, and faith in a better future. With the rare and evocative HUMIECKI & GRAEF fragrances, Fischenich and Mueksch pay homage to two precious and extraordinary women. The brand is dedicated to their*

> *memory and every aspect of it is imbued with their spirit (http://humieckiandgraef.com/company/2/).*

Retrospectively, the example of the name might appear to be in itself part of the intrigue and dramatic tension that is central to the development of meaningful marketing narratives (S. Brown, 2006). Yet, the fact that even today industry experts take a critical stand on the name points at authenticity as a risky design decision.

In fact, the passion for authenticity is also related to core issues of the product and communication design. Thus, in a debriefing interview the marketing manager reported on the campaign photograph promoting one of the earlier Humiecki & Graef perfumes inspired by the pride of a mother. Accordingly, it was a design decision that the photo should show a true mother with her true daughter though this might have been a compromise in terms of advertising standards.

Given the multisensory nature of a perfume this practice of authenticity follows a 'what-you-see-is-what-you-get' or 'what-you-touch-is-what-you-get" principle that builds on fundamental design decisions that are carefully translated across the senses.

EMOTION

Emotions are deeply intertwined with the sense of smell. Olfactory stimuli trigger strong emotions, and olfactory memories can be more evocative and longer-lasting than sight (Herz, 2009). The direct link between the olfactory receptors and the human limbic system accounts for the smell sense as a strong emotional driver.

This is the reason why particularly fine fragrances appeal to the spectrum of human emotions. One example is the label 'Parfumerie Generale', that creates emotions as a reminder of the intimate bond between a person and a particular perfume. Another example is the label Humiecki & Graef that conceptually innovates perfumery by organizing its production around a "basic human emotion" as its core idea. Tellingly, the stereotypical emotions found in perfumery (e.g. desire) are replaced by complex, polyvalent emotions (e.g. motherly pride, fury). Thus, this field of design is opened for the dark side of the spectrum of human emotions. In addition, the development of a new scent coincides with the multisensory design of an emotion.

In a debriefing interview the creative director pointed at another more fundamental presence of the emotional dimension:

> *When I realized how much grandmothers stand for an emotional relationship I wanted to name the brand after the grandmothers. For me the grandmother is an image that sensually communicates the idea of an emotion and the very idea of the brand is about emotion (transcript).*

Accordingly, the overall design of the brand captures the theme of emotion. Thus, the emotional dimension permeates the entire process. The last example illustrates how closely the three categories are linked to each other.

All in all, the emotional dimension permeates the entire design process. Thus it broadens our understanding of emotional design. Our case illustrates how the design of an emotion can impact on the overall process instead of merely considering the emotional experience of the user.

CONCLUSIONS

All in all, our case demonstrates how 'leading innovation through design' can open a stimulating alternative in mass markets. In the perfumery sector the approach presented in this paper does not simply reverse the commercialization of the sector including the old conflict between perfumery and industry. Yet, it fundamentally changes the roles of the professions involved in the process. Thus,

'design takes over from industry' (cf. Ellena, 1991: 345) can be the next step in the history of perfumery.

Our study is based on data from the field of artistic perfumery. However, this design-based innovation has implications for other interdisciplinary design processes. In particular, this case can serve as a role model for other sectors of the growing luxury market. Design increasingly focuses on total experiences that harness all the senses: taste, smell and sound in addition to sight and touch. Thus, perfume as an example of multi-sensory design is a true point of reference.

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LEADING
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Akshay Sharma (2012). *Designing Empowerment: Design Thinking for Social Impact.*

DESIGNING EMPOWERMENT : DESIGN THINKING FOR SOCIAL IMPACT

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This paper examines the efficacy of using design as a tool for empowerment, especially to achieve millennium goals for the poor sections of society.
It examines the critical components of the Design thinking and how it can be applied to any scenario with specific focus on the emerging economies to show case its true potential. The paper makes a case for using Design Thinking as a tool for empowerment of poor. The majority of humans who currently do not fall into a market segment, a user group or a "VOC" data set. They make less than two dollars day and survive. The paper demonstrates how design thinking incorporates invention with emotion, innovation with empathy and consumption with passion for environment as well respect for all the stakeholders.

Keywords: Design Thinking; Innovation ; Social Impact.

INTRODUCTION

Design Thinking is about invention with emotion, observation with compassion, exploration of solution with consideration for each and every stakeholder in the process. This means that we not only consider the needs and wants of the end user but take a step back and look at the complete ecosystem. If a new product or service is a perfect solution for a user group, design thinking would encourage the examination of the all the steps that take place before the product gets to the end user. That would include the manufacturing process / processing of the raw material and how the process can be made "simple" so that the workers on the assembly line have a relatively easy process to follow. Recently, the author started working on a new motorcycle customization project, as part of a class he has offered for the students in industrial design. The process of bringing the bike to its bare frame required only two socket sizes. Now can you imagine how easy must have been in 1985, when the motorcycle was produced, the assembly line needs two sizes of fasteners to install all the everything on a rolling chassis. Another good example is the emphasis on frustration free packaging by retailers like Amazon. It is a small consideration, but contributes in a much better user experience. Keen, the shoe company has redesigned the shoe box for children's shoes. The box turn into a colouring exercise once unfolded, and of course, it is one regular folded sheet of corrugated cardboard in other words, a simpler manufacturing process with less waste resulting in savings for the end user and a better product experience overall. The examples are plenty and it is not the intent of this paper to prove the efficacy of design thinking, rather make it easy to to apply it to any situation, independent of the scale or nature.

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The critical components of design thinking, as listed by Tim Brown, CEO IDEO translate the intent into an actionable strategy. He also debunks a myth that design thinkers are created by design schools or need to have a design school background (Brown, 2008). Brown lists the essential qualities of a design thinker as empathetic, inclusive, experimental and collaborative in nature. This sounds very familiar, aren't they qualities of a successful leader in any organization? So design thinking is not new, we have always witnessed it in different scenarios, only now it has become a new buzz word.

DESIGN THINKERS – HOW DO THEY DO IT?

To understand the different components, let's examine the essential components of design thinking led process:

Empathy is the capacity to recognize feelings. It is a term coined in 1909 by EB Titchener in reference to scientific experiments. It has since become a cornerstone of design thinking. The focus on feelings can provide insights that would otherwise go un noticed. Let us look a recent design project that was part of the design thinking for social impact class at Virginia tech. The team looked at a new way to help users in rural Kenya to charge their cell phones. There is lack or regular supply of electricity and as a result, even though the number of cell phone connections is growing at a rapid pace, the impact better communication channels is held back. The first instinct was to slap a solar panel on the back and help charge the phone using a free source of energy. If it is such a good idea, why don't we all use it? Why should the aspirations need to be scaled down just because someone is poor. In the end, everyone wants to charge the device when they are not using so that they can use it when they need to. The final solution is based on the need to communicate during the day time and charge it when we sleep irrespective of the status of power supply.

Being **inclusive** is another important characteristic of design thinking. This requires having an open attitude to look at the bigger picture. The charging solution required a community based approach and as a result, a local business owner, who would provide these services for a reasonable fee was incorporated into the final proposal.

Experimental nature - Design thinkers need to be experimental by nature. The old saying about thinking outside the box has some validity especially in the realm of creative problem solving. The example of cell phone charging for Kenya is especially relevant here. The first instinct to add a solar panel on the back of the phone would never work because the team started with a solution. The moment the scenario was described, the first solution was a solar panel because it exists, and it is capable of charging a cell phone so it must work. It wasn't until the team experimented with the notion of a paid service that the final proposal took shape.

Collaboration is the backbone of successful design intervention. The number of folks with great ideas is not small but it's the ones who can collaborate actually make them happen. Collaboration requires flexibility and acknowledgement that someone else might be better equipped at implementing your idea. The charging solution for rural Kenya required input of a student from electrical engineering. This collaboration required some changes to the overall form factor as well as the service delivery method for the final solution. The collaboration resulted in a working prototype of the system that underwent user testing in rural Kenya during the summer of 2012.

CASE STUDIES

The paper analyses three initiatives in different fields and provides analysis of their approach as looked at from the design thinking lens.

Design Thinking is not about the solution but about the process. It is not specific to designers but transcends discipline; in fact some of the most effective applications of design thinking has come

from public policy and social sciences. The true measure of success of a design intervention should be the impact it has had on all the stake holders. Few years ago, the Railway ministry decided to replace plastic cups with traditional earthenware in long distance trains in India. The impact was manifold, in a matter of a fortnight. The producers of these earthen pots got a new lease of life, the amount of rubbish on platforms and train tracks reduced significantly and in the end it turned out to be a positive change for millions in the end.

ARCHITECT FRANCIS KERE – DESIGN OF A PRIMARY SCHOOL IN GANDO, BURKINA FASO

Francis Kere grew up in a village, gando in Burkina Faso in western Africa. There was no school in the village and he was one of the lucky ones to receive a scholarship to attend a school and later on earn a degree in Architecture from Berlin. He returned to his native village and designed and built a school with community participation in all stages of the design build process. In 2004, Francis Kere was honoured with the prestigious Aga Khan award for excellence in architecture and this is what the jury noted. "The result is a structure of grace, warmth and sophistication, in sympathy with the local climate and culture. The practical and the poetic are fused," the jury noted. "The primary school in Gando inspires pride and instills hope in its community, laying the foundations for the advancement of a people."

Figure 1 A representative image of the school designed by Architect Francis Kere.
Source: http://www.gizmoweb.org/2011/04/diebedo-francis-kere-primary-school-extension-gando-burkina-faso-2003-2008/

One has to look at the building to realize that every single design decision was based on how well it inculcated community participation. The building uses stabilized mud blocks as the basic unit for construction of load bearing walls. The material came from the site and the labour was provided by the community. The result is a fascinating building that is a testament to the application of design thinking with its empathy for all the stakeholders, inclusive approach in the design as well as building process and reliance on collaboration to achieve the optimum end result.

MID DAY MEAL SCHEME FOR PRIMARY SCHOOLS IN INDIA

The mid-day meal scheme in India was introduced as a result of an interaction between a chief minister and a seven-year old child. When the chief minister asked the child why he was not in the school, the child replied he would if he got food. Today, 110,000,000 children get a free meal in schools run by or supported by the Government.

The phenomenon of SHGs has taken root in rural India – they are not only introducing financial services to millions living below the poverty line but these groups are also becoming producers of goods that benefit the local community.(Prahalad.2005) One such example is a recent India Supreme Court order that prohibits hiring of contractors to supply food to schools where it is provided free of cost to the children. The original intent was to use this as a measure of encouragement for poor families to send their kids to

school. Now that school attendance is significant enough, the government has tied the food supply to SHGs in the area. So instead of hiring a commercial entity with a capacity to supply meals, an SHG in the neighborhood will provide the food. It is an excellent marketing strategy by the government. In the past, the government provides the funds to a large commercial kitchen that supplies the food, in the new model, the same funds will be diverted to SHGs, providing them a steady source of revenue and also regular work. Since the SHGs are run by women, whose kids are in the schools that are receiving the food, it is only natural that the quality of food will be better, there will be less of a need to have a quality control mechanism, and these factors will lead to lower costs for the government. It all sounds like subsidy, but it really is the catalyst needed to kick start a new growth engine. Imagine a whole generation of poor kids, who go to school because of the free food and learn in the process. What results is a large number of these kids go to colleges and eventually become contributing members of the society. Hence, what was a government run program, becomes a decade long marketing strategy to increase the overall market potential many fold for our society. The SHGs have the potential to provide locally made products to the community that will not only provide employment to women of SHGs but also increase their income so that they can invest in other services/products to have a positive impact in the lives of their families. The strategy needs to be one of capacity building in the first phase that leads to a wider consumer base in the traditional sense.

BAREFOOT COLLEGE

Is it possible to teach illiterate users a set of skills that we usually do not associate with the poorer classes? The author visited the campus of Barefoot College in Rajasthan, India. This visit provided considerable evidence of the positive impact of female entrepreneurship and empowerment. The Barefoot College was established in 1975 in the village of Tilonia, Rajasthan, India. Its primary goal has been to provide better opportunities for the local population through education and skill development. It is a case study in the strength of conviction, inspired learning, and decentralization of power. The campus itself is a great example of participatory architecture, where the local community was involved at every stage of the design process. They designed it, built it, and now they use it. Barefoot College also won the prestigious Aga Khan Award for Excellence in Architecture in 1985, which it respectfully declined (a story for another article). The campus is run on solar energy generated by solar panel systems manufactured by Barefoot Solar Engineers. On another part of the campus three Barefoot Engineers are busy manufacturing solar cookers, which are used not only on the campus but also in day care centers in the region. These cookers are complex devices that require an in-depth understanding of solar trajectory to achieve proper setup and optimal performance. The three engineers can barely read and write, but they can manufacture, install, and maintain these cookers at the highest professional levels.

These workers are mostly women, and they also train new students from Afghanistan, Sub-Saharan African countries, and countries in the Indian subcontinent. The Barefoot College Village Dentist is a program run by two semiliterate women who received six months of training

from a visiting dentist from Germany. Today the clinic provides dental services to approximately 30,000 residents in the area. It also runs awareness clinics for local schools and communities. The treatment is very affordable and it is free for those who can't pay for it.

Another example is ''Sathin'' Sanitary Pads. This is an excellent story where the marketing strategy is based on need analysis and supplying long- term benefits. In rural India, even today a large number of women use a cloth or a rag to take care of bleeding during their menstrual cycle. The Barefoot College set up a small manufacturing unit that makes low-cost sanitary napkins. A pack of six costs Rs. 12.00 (25 cents) that is about 1/8th the cost compared to a reputed brand. Of course there is a difference in quality but the bigger question addressed is an essential need adequately met at an affordable price. The pads are manufactured using a labor-intensive but low-cost method that keeps the final cost of the product low. The packaging is used for creating awareness about other women's health- related issues like birth control and sanitation.

More details on the innovator of the machine can be found at http://www.thebetterindia.com/2865/grassroots-innovation-mini-sanitary-napkin- machine-for-rural-india/. There are many other inspiring stories on the website http://www.barefootcollege.org.

A SELF-HELP GROUP AS A PLATFORM

An SHG is a platform that brings like-minded individuals from similar economic backgrounds together so that they have a better chance of overcoming a common challenge, in this case poverty. Imagine a community of weavers or shoemakers in a remote rural region. They work as daily wage earners. They make things from the raw material they receive from a contractor who supplies the finished goods further up in the supply chain. If they form an SHG, the members will be able to provide micro loans to each other at a lower interest rate and the interest earned would stay within the group itself. The intermediate benefit of the exercise is a linkage with a financial institution that would recognize the SHG as an entity. This group can then get loans, transfer funds, and have access to other financial services. The group members are responsible for managing all aspects of the group with help from Nongovernmental Governmental Organizations (NGOs) working in the sector.

SHGs create conditions for group decision making and provide ''doorstep banking.'' (Imagine a person who makes few dollars a day not only having a say in the interest rate that she will be paying but also in the number of payments she will make.) Financial institutions provide wholesale credit to the group, and NGOs provide logistical support to help members make

informed decisions about capacity building, expansion, and marketing of their products. (Parikh, Javid, & Sasikumar, 2006); This simple concept of creating a formal interface for a previously unorganized (Jones, 2008); section of society has resulted in 188 million (18% of the total population) of India's poor being, at least in this way,

enfranchised. An important source of data on selected micro finance institutions is the MicroBanking Bulletin, which is published by Micro-finance Information Exchange. At the end of 2009 it was tracking 1,084 Micro Financing Institutions (MFIs) that were serving 74 million borrowers ($38 billion in outstanding loans) and 67 million savers ($23 billion in deposits). The program has resulted in increased income for the poor. They have

been able to build assets that can be leveraged to secure further credit. Their respective spending on education has increased as the program has indirectly encouraged a new focus on learning. The empowerment of women has been one of the most important contributions, as it has had a cascading effect on a series of other issues like child mortality, nutrition, housing,

and health. (Holvoet, n.d.) The SHG-Banking partnership has created opportunities for the finance sector as well. Banks have realized the size and growth potential of this user group and have begun innovating in micro insurance products. The phenomenon of SHGs has taken root in rural India – they are not only introducing financial services to millions living below

the poverty line but these groups are also becoming producers of goods that benefit the local community(C.K.Prahlad, 2005). One such example is a recent India Supreme Court order that prohibits hiring of contractors to supply food to schools where it is provided free of cost to the children. The original intent was to use this as a measure of encouragement for poor families to send their kids to school. Now that school attendance is significant enough, the government has tied the food supply to SHGs in the area. So instead of hiring a commercial entity with a capacity to supply meals, an SHG in the neighborhood will provide the food. It is an excellent marketing strategy by the government. In the past, the government provides the funds to a large commercial kitchen that supplies the food, in the new model, the same funds will be diverted to SHGs, providing them a steady source of revenue and also regular work. Since the SHGs are run by women, whose kids are in the schools that are receiving the food, it is only natural that

the quality of food will be better, there will be less of a need to have a quality control mechanism, and these factors will lead to lower costs for the government. It all sounds like subsidy, but it really is the catalyst needed to kick start a new growth engine. Imagine a whole generation of poor kids, who go to school because of the free food and learn in the process. What results is a large number of these kids go to colleges and eventually

become contributing members of the society. Hence, what was a government run program, becomes a decade long marketing strategy to increase the overall market potential many fold for our society. The SHGs have the potential to provide locally made products to the community that will not only provide employment to women of SHGs but also increase their income so that they can invest in other services/products to have a positive impact in the lives of their families. The strategy needs to be one of capacity building in the first phase that leads to a wider consumer base in the traditional sense.

DESIGNING EMPOWERMENT INITIATIVE

These research findings provide the basis for the ‘‘Designing Empower- ment’’ initiative at the Virginia Tech Industrial Design program. We apply the design process to explore solutions for some of the most pressing issues related to education and primary health for people living below the poverty line. The design process has taken the faculty and students on two trips to India for testing of prototypes and getting valuable feedback from the end users. The team has students and faculty from multiple disciplines and all of the solutions are available for free download under the creative commons license. The design teams have created a financial literacy education tool for women who cannot read or write and are part of a micro financing SHG. The solution was presented to the Ministry of Women and Child Development in Rajasthan, India and has become part of their official training program for formation of SHGs. The design teams have also created a community learning multimedia device that has a computer with high lumen projection capabilities. Our research findings show a new cultural phenomenon of ever increasing number of cell phones in developing societies. At present 75% of the Indian population has access to cell phones and poised to be 100% by 2014. This growth in the communication sector has not only provided a user base that is able to access information at will but has also provided excellent design opportunities. The team has created an innovative cell phone based data management system for immunization records in irregular urban settlements. We clearly have identified the importance of women entrepreneurs in initiatives linked to the bottom of the pyramid. Empowered, entrepreneurial women with access to financial resources can have a far-reaching impact at multiple levels in their society. The February 2010 United Nations report emphasizes that increasing women’s access to resources exerts strong multiplier effects on a range of development goals, including poverty reduction, child welfare, and economic growth. Finally, female empowerment is reflected in increased spending by the family on children’s education.

SELF HELP GROUPS

SHGs empower the poor by providing access to financial services, such as credit, savings, and money transfers. Fifty-two million people living in poverty have benefited from micro financing with the loan repayment rate close to 99% (Goyal et al., 2007). The beneficiaries are those who survive on less than $2 a day. Research has shown that micro financing impacts communities only when it is women-centered. It has provided women with the opportunity to make financial planning a part of their lives; it has also provided them financial tools that enable them to use their income and savings to break the cycle of poverty.

We studied NGO-facilitated SHGs that are engaged in micro financing in rural Rajasthan. NGO representatives explain the advantages of micro financing to a group of women who believe in the long-term benefits but often without really understanding the details.(Mayoux, 1997) The members join the program because of a mutual understanding among themselves: a trust in the system of micro financing and a desire to make their families' lives better. These observations gave us an understanding of the process from the end-user's perspective and revealed a major design opportunity for a pilot project. The members' lack of understanding about the process of running an SHG leaves them vulnerable and is responsible for the failure of about 15– 20% of SHGs in the first year. The primary driver for the members is savings, but the real growth engine for the group is the intra-group loans. SHG members can get loans at half the market rate and the interest they pay on the loan goes back to the group. This results in a significant increase in the group's income over time. The net income in the first year of an SHG operation is about 25–30% of their total savings. If the group uses most of their savings to provide intra-group loans, the interest earned on these loans quickly translates into exponential growth of their net income. In the seventh year of operation, a group can have approximately 65% return on its total savings. NGOs have proven inadequate in educating SHGs in a manner that makes sense to the semiliterate or the illiterate user. The

Virginia Tech Industrial Design program decided to address financial literacy through the pilot projects undertaken by the Designing Empowerment initiative.
In fall 2009 the author completed research in rural Rajasthan and shared those findings with a team of six industrial design students. Sitting around a white table in the industrial design studio at Virginia Tech, we discussed project ideas, all of which addressed issues of social relevance and empowerment through design. This is how Designing Empowerment was born.

The methodology used is very similar to a design project in a studio, but the projects present a possibility for making a difference in the life of someone in poverty. Thanks to improved communication networks, it is possible to get a good understanding of issues that are important for users in other cultures. Besides the data collected about the functioning of SHGs, the team looked at online resources to better understand the process. One of the team members had experience working at the Grameen Foundation in Bangladesh. Since the pilot project was only five weeks long, we had to innovate at every step of the process. One thing we decided at the beginning, which helped immensely, was to accurately recreate the conditions on the ground for our students. The students had to memorize their own names in a foreign language so they could have the experience of knowing what their names look like but not able to read the script. The currency notes were color- coded, and the students had to figure out the denominations by identifying the colors alone. For idea testing, we had a blanket ban on any text or language-based instruction; all steps had to be performed visually. ‘‘Laxmi’’ is an engaging, interactive language-independent system that focuses on educating the end user about the long-term benefits of financial planning by providing them tools to become self-reliant users. The present form is inspired by a traditional board game borrowed from the local culture. Made out of cloth, it can be compared to a 5 foot by 5 foot cross where the cross members are 12 inches wide. Its shape, which is not unidirectional, encourages participation by the members. The idea

was introduced to 4 SHGs consisting of 15 members each. Increased savings, from not paying for outside expertise, excited the newer users and made them eager to experiment with the new system even when it meant more work. The groups who agreed to test the prototype simulated five meetings to keep track of financial transactions. The prototypes were tested for physical characteristics, like the size of the pockets, the ease of understanding the structure, and the overall usability in maintaining a visual account of financial transactions. The format of the prototype allowed the group accountant to transfer details into a standard SHG register. It also facilitated better participation in the meetings and gave the members a sense of ownership. Testing results were favorable. Members expressed enthu- siasm about learning the system and were eager to adopt it for their group meetings.

In its present state, the ‘‘Laxmi’’ system is being adopted by three NGOs in India as well as by the Ministry of Women and Child Development and will be a part of their training program for new SHGs. The present version has evolved into an interactive financial literacy system that is language independent, allows for an immersive experience, and provides a simple

and easy way to understand the concept of interest. Adoption was easier because it accounts for the needs of this consumer and is based on some- thing familiar. The design team is working on an electronic version as well, adaptable for use on a computer or a tablet. It will provide customization and scalability options further enhancing the efficiency of the system from the NGO facilitator’s point-of-view. The successful adoption of this system by organizations in India has also encouraged the design team to pursue other projects related to empowerment.

A further example, K-yan, an integrated multimedia device, was first developed in 2003–2004 by IL&FS, a multinational corporation in India, in collaboration with IIT Bombay. Designed for group learning in schools and other educational communities, this integrated device furnishes an instructor with easy-to-use tools that present multimedia content to a large group in an interactive and engaging manner. In 2010, the Virginia

Tech Industrial Design Department was approached by IL&FS to develop a new visual language for K-yan. The team, composed of students and faculty from both the design and engineering departments, explored various potential configurations and combinations to create a compact and portable learning device. Special attention was given to such aspects as usability in dusty environments, cable management, and ease of main- tenance. The team also reflected on the exact relationship between function and the overall form of the product: Should it be a projector or a computer? Does it need an identity of its own? In the end, through an exploratory process supported with quick prototyping and testing, the team settled on a form inspired by a book and complementing the way a user would set it up. IL&FS has decided to adopt the recommendations provided by the design team.

CONCLUSIONS

The Designing Empowerment initiative challenges students to learn about a foreign culture, conduct field research, and contact the user group that is in desperate need of these solutions. From the start, it was very clear about the theoretical impact such projects can have in an academic setting. They also can have clear and measurable benefits for students. The projects we have undertaken have come with very strict constraints as well as limitations that are generally not associated with the design process alone.

Because we are designing for cultures that we know very little about, the process demands new and innovative ways of conducting research and making the best of available resources. We have done that by cleverly simulating the conditions on the ground, like making the students work with a language that they cannot read or write and making them identify the most basic action to turn something on. Another important aspect of the projects has been collaborating with individuals who are working with the end users on a daily basis. We share every new development with an expert on the ground. The risk of not addressing the right

question can result in a loss of valuable time and resources. We have also enrolled students from institutions in India so that when the proposals are being tested and need some minor changes this work can be addressed in India, rather than waiting for the next semester's project to begin. These studio projects have given students an enriched experience, helping them develop a much better understanding of the design process and the importance of decision making when they measure everything against so many limiting parameters. Later on, when they are working on projects with fewer constraints, this early experience will allow them to perform at a higher level.

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DESIGNING EXPERIENCES IN EVENTS – A STUDY ON EVENT AGENCIES IN PORTUGAL

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This study aims to explore how 'design' is related to 'experience' within an event industry context, with the expectation of establishing higher recognition of the value of design in consumer experiences within event projects. There has been a substantial amount of research conducted within the field of design and events respectively; however there is little research demonstrating the value of design within events as part of the new paradigm of experience design and modern models of practice. There is also a lack of information on current practice within the event industry. Five event agencies in Portugal were sampled to represent the event industry in most post-industrial societies, with in-depth interviews used to collect data.
This study concludes that despite the stated recognition of the value of design in the very existence of events and acknowledged importance amongst other disciplines, design is undervalued and unexplored. The concept of experience as an offer or even as a design discipline is almost completely disregarded from agency discourses. The findings on organisational structures, work processes, design and consumer engagement in the context of Portuguese event agencies provide valuable insight into business and practice within event projects. Based on the findings, the authors have developed a conceptual framework on the event experience cycle which contributes to knowledge by proposing a new way of exploring the connection between the experience cycle and design process. This forms a starting point for further research into practice. For the first time, experience is located at the centre of event projects from beginning to end, turning experience design and event management into the main areas of knowledge behind this concept for event projects.

Keywords: Events, Experiences, Design

THE EVENT INDUSTRY AND EXPERIENCE ECONOMY

Experiences in the context of business are 'the moments when a company intentionally uses services as the stage and goods as props, to engage individual customers in a way that creates a memorable event' (Pine and Gilmore, 1998:98). Experiences are inherently personal to individuals, as opposed to commodities and services, which are external to consumers. Experiences exist only in the mind of the individual who buys experiences, and are the product of the individual's preceding state of mind and his/her interaction with the staged event. Thus, the buyer of experiences could be engaged at emotional, physical, intellectual or spiritual level. Pine and Gilmore (1998; 1999) consider that experiences have been infused into all aspects of consumption and existence, leading to the emergence of the new economic offering of experiences which is believed to be an answer to the consumers' request and desire for experiences from businesses.

The Experience Economy was first introduced by Pine and Gilmore (1998; 1999) who consider that experiences are as distinct from services, as services are from goods; and

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consequently, as the commoditization of the goods industry led to the success of the services industry, the latter will do so for the experience industry; thus experiences become the new economic offering in the experience economy. Grefé (2000) believes that meaning is the only true currency in this economy and experience design provides the way to create (not add) value in this economy. This fourth economic offering is an answer to the consumers' request and desire for experiences from businesses. In an experience economy, consumers are viewed as buyers of experience or guests, and suppliers as stage directors; whereas in the industrial and service economies consumers were called users and clients, and suppliers were manufacturers and providers, respectively. The dominant economic function in an Experience Economy is therefore to stage, while before it was to create (industrial) and to deliver (service). Hence, the focus factors are no longer characteristics (industrial) or benefits (services economy) but sensations. And most importantly, the nature of the offer is now memorable, instead of tangible (industrial) or intangible (services).

Holbrook and Hirschman (1982) have already recognized the importance of focusing on consumer experiences, as it is the only way to transmit the symbolic meanings of products and services' features and benefits – the subjective aspects. The argument is that value derives from the combination of customer experiences as well as from the values from within products and services (Baron et al., 2010:75). As such, consumers are perceived to be culture producers (Arnould and Thompson, 2005) or co-creators of value (Baron et al., 2010), instead of culture bearers. Baron et al. (2010) go further, arguing that the focus is now on marketing 'with' customers than 'to' customers, as they now participate in the creation of value. Therefore, Shaw and Ivens (2005) believe that the customer experience is the next business 'tsunami'. Companies move away from providing just products and services, but 'experiences' – 'memorable events that engage customers in an inherently way'- and 'transformations' – 'a series of experiences that change the customer in some fundamental way' (Baron et al., 2010:76).

In exploring the concept of experiences, there is a clear connection and implication of experiences in analysing events. Event marketing is recognised as one of the most important tools in the marketing mix in delivering experiences to consumers. Over the last ten years, events have been subject to a major shift in focus and purpose, moving far beyond entertainment as traditionally defined. Today, events are recognised to have made significant contribution to culture, arts, education, and tourism, and have generated new business opportunities and careers, with significant professional implications (Bowdin et al., 2006). Due to its complexity and diversity, the event industry does not have a clearly defined scope; but the emergence of industry associations, training courses and accreditation schemes, shows that this industry is becoming stronger and more attractive, turning into a highly competitive profession.

Research has confirmed that events contribute to increasing market share and promoting brand image (Bowdin et. al, 2006), and maximizing Return of Interest (EventView, 2009). Given this, a recent global survey (EventView, 2009), aiming at understanding the role of events within current marketing frameworks, reveals that 27% of the average marketing budget has been spent on event marketing, and that 32% of the respondents consider events as a vital component in their marketing plans. According to the report, the rising confidence in events marketing could be attributed to the capacity of events in forming customer relationships, as events provide comprehensive and compelling interactions with the audience. Concerning the current global financial crisis, a special issue in 'Festas e Eventos' magazine (Sousa, 2011) has explored how the event industry in Portugal is affected. The study has revealed that the general perspective is very positive, as many believe that the crisis provides greater opportunities for this sector, specifically when brands (clients) are looking for ways of getting noticed in the market (Sousa, 2011).

The value of design in experiences is recognised in literature, based on the assumption that designers always possess a unique way of relating to experiences due to their innate empathy towards consumers (Powell, 1996). Studying the role of design in events, however, is a relatively new field. It falls within several knowledge streams including experience design, project

management, design management, the experience economy, experiential marketing, and experience-centric services. Given the growing importance of events in marketing, understanding the role of design in events becomes of increasing interest to both research and business practice. In literature, it has been recognised that design does add value due to the higher level of creativity it brings into events. If designing the experience is the new challenge, Press and Cooper (2003) see the challenge places new demands on the working methods of designers, and in particular the research that underpins their practice. Significantly more research is needed to explore this topic further, especially with a need to focus on the practice of design in events.

Given this, in academic literature, experiences in event, as a research topic, is still up and coming; whilst lacking theories and empirical studies unpinning the practice. For example, theoretical approaches still consider events as services (Figueiredo, 2011), as opposed to experiences proposed by Pine and Gilmore (1998, 1999). This study therefore aims to understand the extent to which consumer experiences are perceived as important to events and how design is incorporated in the process of event management.

RESEARCH FOCUSES

OBJECTIVE 1 – EXPERIENCES AND GUESTS IN EVENTS

Experiences are rich, unique and multidimensional (Berridge, 2006) and today they are already distinguished as diverse types. Riedel et al. (2010) recognized eight types of experiences created by companies following experience-stating strategies based on the concepts of: simplicity, visibility, invisibility, community, entertainment, prestige, confidence and innovation. Pine and Gilmore (1998, 1999) identified the four realms of experience - entertainment, educational, aesthetic, and escapist - that when combined can create unique experiences and enhance the 'realness' in them.

The concept of experiences, however, is still new and lacks theoretical explanations. The dialectic relationship between context and cognitive activities is considered by Gupta and Vajic (2000) as the actual 'core of a unique and memorable experience'. Berridge (2006:73) agrees with this and defines experiences as a 'by-product of a consciously designed environment where clear decisions have been made'. This means that experiences are multidimensional and perceived differently by different individuals. This is consistent with Hirschman and Holbrook's (1982:132) theory which recognizes the consumption experience as a 'phenomenon directed toward the pursuit of fantasies, feelings, and fun' and suggests a focus on the symbolic meanings of contextual factors. Pine and Gilmore (1998; 1999) suggest businesses stage experiences, not by entertaining but engaging consumers. They could be measured by the two most important dimensions of experience engagement: the customer participation level (from immersion to absorption) and the connection or environmental relationship customers maintain with the event (from passive participation to active participation). It is therefore important to develop a culture in which guests can negotiate, gain and express meaning from the events and participating in activities is taking meaning from them and subsequently acknowledging that meaning.

In events, activities are organised as projects, as suggested by EMBOK (n.d.), including initiation, planning, implementation and closure stages. The event organizer is dependent on the development of collaborative alliances with a number of stakeholders to implement it (Larson and Wikström, 2001). The organization of events is shaped by relationships among key stakeholders, who are intertwined in a complex network, which is strongly characterized by individual interests. This challenges the idea of putting consumer experiences at the centre of an event project. Event management – the process by which an event is planned, prepared and produced (Silvers, 2003), like any other form of management, should aim at achieving the project objectives, here, staging consumer experiences.

Given the newness of experiences as a theoretical concept, it is not clear in practice, whether the focus of experiences is maintained throughout an event project. This study aims to

understand the extent to which consumer experiences are perceived as important to events; and in practice, whether and how the guests are engaged in the process of developing events.

OBJECTIVE 2 – DESIGN IN EVENTS

Design, as a process and source of creativity, is vital in creating consumer experiences – the core element in events. Powell (1996) believes the design practice has a 'unique' and 'special' way of relating to experience because the designer's empathy with the user can ensure a positive experience that will lead to customer loyalty and business growth. Given this, Press and Cooper (2003) suggest that the designer be an 'enabler of experiences' – it happens around an object, rather than just a 'creator' of objects. Lauralee Alben (cited in Press and Cooper, 2003) suggests designers use their humanness, or human qualities alongside the required professional training and experience as the recipe to build enlivening experiences. Further, according to Cova (1996), this humanistic culture inherent in designers allows them to interpret external signals (trends and subcultures) and translate/communicate them to the team as design managers/directors involved in leadership actions. Riedel et al. (2010)'s study has also confirmed that the strategies focusing on customers' emotional responses have generated higher levels of loyalty and more positive word-of-mouth. Berridge (2006) therefore suggests that the link between design and experience is fundamental in developing a framework in forming methods to create, analyse and interpret experiences.

Shifting from designing products to designing cycles of customer experiences require organisations to refocus the design problem on the customer experience (Rhea, 1992). This leads to the concept of 'experience design' aiming at creating experiences beyond just products or services and thus has wider boundaries than traditional design disciplines. Experience Design can therefore be recognised as a new way of thinking, a new work process or a new mind-set for designers, according to Berridge (2006). Pine and Gilmore (1998, 1999) believe experiences will become a business art through experience design, just as product and service design is today. However, design is usually excluded from traditional event management domain. Brown and James (2004) were probably the first to consider design as part of the discipline in their definition of event management, marking a significant breakthrough in this field by giving design and creativity the credit they deserve in events. According to Jackson (2005, cited in Berridge, 2006:10), design 'gives a focus to the role of artistic interpretation and expression and, ultimately, points the way forward for understanding events for the experiential dimensions they exhibit'. In a later development, design is considered as one of the five core domains of the discipline, along with administration, marketing, risk, and operations (EMBOK, n.d.).

Following this, Gupta and Vajic (2000) consider one of the critical conditions for creating experiences is designing activities in which consumers can be engaged; Ashcraft and Slattery (1996) suggest building brand cultures to create emotional relationships between consumers and experiences. Further, in achieving the ideal scenario that 'event concept, design creativity and experience setting blend equally' and that design and experiences meet, Berridge (2006) suggests a close relationship between event designer and event manager in working for the client's satisfaction. Fundamental questions remain as to how design is incorporated in the process of event management; and the extent to which the value of design in creating consumer experiences in events is recognised in practice.

RESEARCH APPROACH AND METHODOLOGY

Five event agencies in Portugal (See Table 1) were investigated. This is based on the conclusion Bowdin et al. (2006) drawn that the history of modern events in Europe reflects the evolutions of other post-industrial societies, revealing similar patterns in other countries. Therefore, this study assumes that the sample is highly relevant to other post-industrial countries.

Table 1 Case Study Sample

	A Brief Description	Years in industry	Speciality and services	Examples of clients /projects	Location/s	Interviewees
Case study 1	Emotional marketing agency	15	Stadium-scale events, celebrations and public events, galas, corporate events, and sport events	African Cup of Nations, Optimus	Portugal (Oporto, Lisbon), England (London) Spain (Barcelona, Madrid) Luxembourg (Benelux)	director, designer, producer
Case study 2	PR and events agency	7	Brand launching, institutional and corporate events, conventions and seminars, event consulting and communication	Microsoft, Mercedes, GALP Energia	Portugal (Lisbon)	director, designer
Case study 3	Events agency	11	Space management, design, catering, audio-visuals and multimedia, and entertainment	LG, Chevrolet, TMN	Portugal (Lisbon)	project manager, marketeer, production assistant
Case study 4	Events factory	4	Corporate events, staffing, consultancy, catering, design, decoration, photography		Portugal (Lisbon)	partner/event manager
Case study 5	Promotional marketing and events agency	6	Events, staffing, design	Apple, Cadbury, EDP,	Portugal (Lisbon)	key account

A number of key members from each of these agencies were interviewed. In-depth interviews were used to collect the views of the most relevant members in event teams and their work experience in the industry. From each agency a ‘story’ was told in this phase of research, allowing the researchers to understand how these companies structure their teams, how they define and follow individual work processes, which are the main stakeholders involved and a general overview of the relationships and exchanges generated from these issues. By identifying the possible similarities and dissimilarities between case studies, the results are discussed based on the two objectives proposed:

- How design is incorporated in the process of event management; and the extent to which the value of design in creating consumer experiences in events is recognised in practice;
- The extent to which consumer experiences are perceived as important to events; and in practice, whether and how the guests are engaged in the process of developing events.

The researchers recognise that due to the internal focus proposed in this study, only managers, designers and producers were interviewed to develop each case study. Therefore, the results have limited implications attributed to consumer and client perspectives on the issues discussed.

FINDINGS

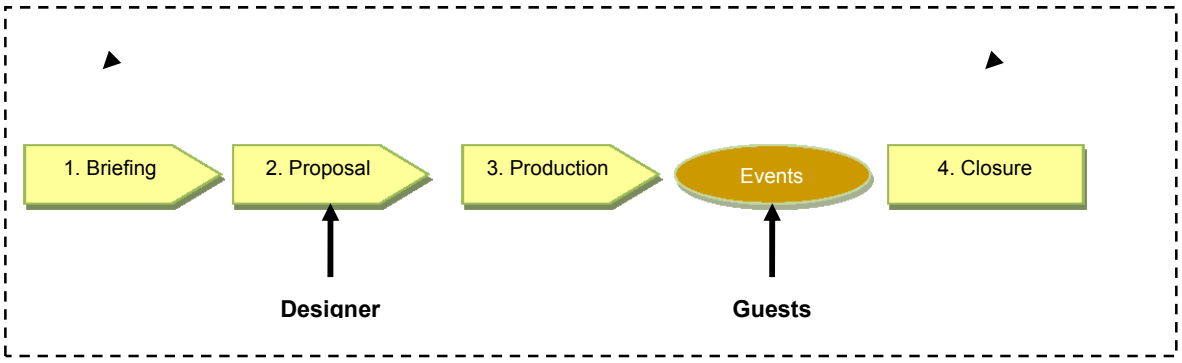
GUESTS ENGAGEMENT IN EVENTS

According to Pine and Gilmore (1998; 1999), in the experience economy the purpose of staging experiences is not to entertain but to engage guests. This study provides a snapshot as to whether this change of focus is recognised and practiced in event agencies.

First, the results shown that experiences were perceived important in events across all agencies. A majority of agencies could relate this to a focus on guests. For example, one agency considered that all experiences were relevant and that the agency always tried to achieve a 'cerebral print' of the participants, and to make experiences memorable for the guests. In order to do so, the agency believed in 'humanizing' events, making them closer to guests and giving the guests a feeling of ownership. Similarly, another agency acknowledged guests as the most important element in events, and believed that in creating involvement and generating participation, guests would retain something important from the event or the experience. One agency also related experiences to the achievement of a connection between the brand and the guests.

In practice, these event agencies employ a similar process: briefing, proposal, production and closure process (See Figure 1). This is consistent with EMBOK (n.d.)'s event process chart.

Figure 1: Process



In all cases, briefing and proposal are considered the most important stages in an event project, as in these stages concrete solutions are formed; and potential viability is considered to minimize risk that may occur in the latter stages. It is generally believed that once a good proposal is developed, the production is a winner. When considering the key information in developing proposals, only one agency mentioned guests' emotional experience as one of the elements, and others focused only on the basic information such as date, place, time, objectives, targets, budget and the client. It appeared that no research was carried out following the briefing (with the exception of one agency who mentioned informal guest research). It appears that the source of information for proposal development was largely limited to the clients. Inputs from guests were excluded in this key stage.

Guests' involvement only appears during the events (as indicated in Figure 1). At the final stage of evaluation, a majority of agencies mentioned they retrieved feedback from the clients, either informally in a conversation or formally through questionnaires. A majority of agencies relied on client's feedback to evaluate the success of the events. Considering experiences are highly significant to achieve guests' satisfaction and thus event's success, these were not mentioned in the interviews as one of the criteria. It is arguable that although for agencies, client satisfaction ought to be the key measurement for the success of the project; it does not necessarily lead to a memorable experience from the guests' perspective. As suggested by Pine and Gilmore (1998; 1999) the two most important dimensions of experience engagement: the customer participation

level and the connection or environmental relationship customers maintain with the event, were not considered in their evaluation.

It appears that these agencies do not assume the responsibility of delivering experiences but event projects; or it is likely that agencies consider they are working on experiences, but the fact is that they keep entertaining but rarely engaging – engaging is more than participating in activities. Across all agencies, the process does not embrace a culture in which consumers (here, the guests) are encouraged to negotiate, gain and express meaning from the events; and experience engagement is not recognised and facilitated.

DESIGN IN CONSUMER EXPERIENCES

Hirschman and Holbrook's (1982:132) theory suggests a focus on the symbolic meanings of contextual factors. This puts designers in a key position, because the designer's empathy with the user can ensure a positive experience (Powell, 1996). In event agencies, it is not clear whether this role of the designer is recognised and resourced accordingly.

Design is considered one of the three key functions – management, creative and production – in all agencies. In larger agencies, these functions are clearly identified as separate groups of professionals acting on specific phases and tasks within event projects. In two agencies, design is outsourced for financial and administrative reasons. The advantage of outsourcing design is that it enables contracting different design specialists according to the requirements of the events. However, outsourced designers can only be involved at limited stages according the type of activities or tasks performed. Other outsourced professionals mainly include logistics, security, and architects.

Compared with outsourced designers, in-house ones were involved in more activities and were assigned with diverse tasks in an event project. The advantage is apparent, as in-house designers have significantly higher influence and involvement in the project. As suggested by Berridge (2006), in achieving the ideal scenario that 'event concept, design creativity and experience setting blend equally', a close relationship between the event designer and event manager is critical. Given this, the key stage where designers are considered most valuable is the 'proposal' stage (See Figure 1).

In the interviews, design was referred to as 'fundamental', the 'pillar in events', ' powerful' and 'everything in events', 'indispensible in today's events', and 'an advantage'. This is because design in event projects is seen as responsible for communicating messages, concepts, and experiences through images, ambiences and objects. All case studies show that designers or creative professionals are more present in the first stage involving brainstorming and proposal development. Given the perceived importance of the first stage, the value of designers' contributions is highly acknowledged (See Figure 1).

Although design was highly regarded, it was not considered directly connected with experiences. When asked the question as to whether designers were seen as designers of experiences, all interviewees, to some extent, acknowledged the value of design in consumer experiences, due to the creativity associated. It was also commented on that the term 'event' does not even make sense anymore, as it was 'experiences' not 'events' what the agency was developing. Interestingly, one agency preferred to be acknowledged as problem-solvers, leaving experiences in a secondary place resulting from the activities of problem-solving. However, only one agency related design with the content of events, not just with the image as others did. The theory is that that graphic work does not survive in isolation of the context and it needs to live in symbiosis with activities; and the value of design in experiences is to interpret external signals (trends, subcultures) and translate/communicate them to consumers and the team. This was not recognised by a majority of agencies.

This contradiction is interesting because when agencies mentioned the role of design in scenarios and communicational work they meant as they had the important role of translating the

message into those elements as executers and not as their role in portraying any experiences with the elements. The shift of focus to designing cycles of customer experiences requires organisations to refocus the design problem to the customer experience, as Rhea (1992) has suggested. He believes that it is through this focus that new opportunities arise in the use of design towards innovation. He also suggests that in the cycle of customer experience, time is crucial in understanding, analysing and redesigning the customer experience towards perfection. This concept brings together every aspect of customer interactions with products (here, the experiences) where all stages have equal importance, providing practical tools to analyse consumer engagement from beginning till end.

DISCUSSION AND IMPLICATIONS

The findings show that the importance of experiences in events was recognised in determining the satisfaction of both guests and clients; and equally design was perceived as fundamental in event projects. However, the importance of engaging guests in creating experiences was not recognised, and very few interviewees identified the connection between design performance and experiences. This may indicate that although experience has been regarded as one of the key elements of event projects, agencies have not realised how important it is to consider the experience cycle of consumers in process of creating experiences; and how design could potentially contribute to enhancing experience beyond the simple graphic and communicational work.

Based on these, this study suggests a shift of focus from creating events to designing experiences. A model (See Figure 2) is proposed with reference to Rhea's (1992) Design Experience model (shown as the inner ring of Figure 2) and EMBOK's (n.d.) Event Management process (shown as the outer ring of Figure 2). As Berridge (2006, p.8) suggests that 'if we focus our attention on the process of management as opposed to the outputs we can more readily understand events', which forms the proposition of this model.

The model assumes a five-stage event process, and examples of possible sub-stages are included, as shown in Figure 2. It aims to illustrate how the design process could possibly be embedded in the cycle of guests' experience from the moment they become aware of the event till they have acknowledged its meaning in their lives; and to suggest that successive events could build upon existing experiences basis. This model suggests a shift focus from the type of events, such as religious, cultural, musical, sporting, personal and private, political and governmental, commercial and business, corporate, leisure and special events (Raj et al., 2009), to type of experiences, for example, sensory, affective, creative cognitive, physical (behaviours, lifestyles) and social identity experiences, as suggested by Schmitt (1999a, 1999b).

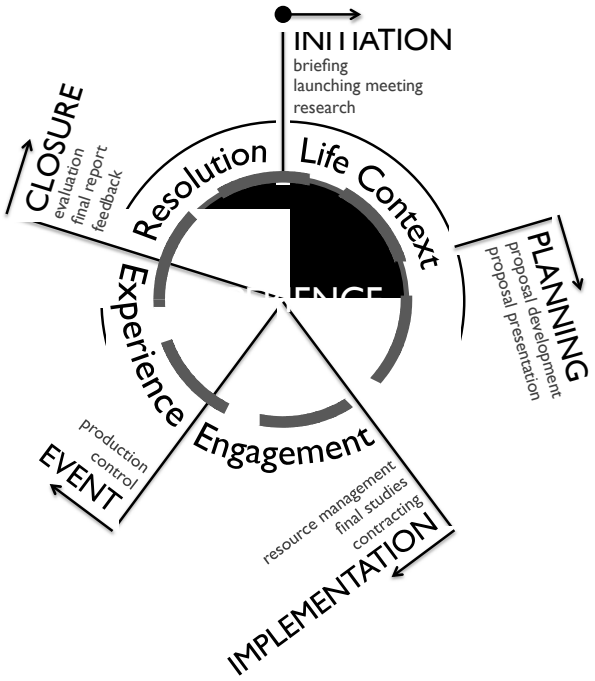
This implies that event projects move away from designing events, to designing experiences. As goods and services have become increasingly commoditized, what consumers look for today is offers that 'dazzle their senses, touch their hearts, and stimulate their minds' (Schmitt, 1999b:57). In the context of business, these experiences are described as memorable events that are created at the moment when customers are intentionally engaged (not entertained). However, as events only occur when someone plans them and creates them, experiences are not 'self-generated but induced' and thus 'complex, emerging structures' (Schmitt, 1999a:61). It equally requires planning, managing and implementing. As suggested by Ashcraft and Slattery (1996) a new era in experiential-based design following the previous era of technology-based product development.

The value of experience, as an economic offering, as the basis of a new era and as the solution for consumers' new needs and desires within events, has been the trigger for the development of this conceptual model for event projects, which comprehends the cycle of guests' experience as its main focus, the phases of event management process and guidelines for its management. If events are experiences, if guests desire more than simple products and services, if

we live in an experience-based design era, the focus should be on designing experiences not events.

The shift of focus for event projects suggested in this study (from designing events to designing experiences) implies that substantial changes could be made in work processes and roles of professionals. It also suggests a stronger three-way relationship between designer, client and guest, working towards unique types of experiences rather than planning and producing the same impersonalised events; and the rise of experience design and event management which turn into the key knowledge providers behind event projects.

Figure 2: The event experience conceptual model.



One way towards the understanding of the experiential dimensions of events and designing experiences is suggested through a focus on the role of artistic interpretation and expression (Jackson, 2005, quoted in Berridge, 2006) and experience design (Pine and Gilmore, 1998, 1999). Expressing experiences in design means working with multidisciplinary teams for the 'whole experience' in interaction (Moggridge, 1999), and experience design as a discipline allows for wider boundaries beyond the simple creation of products and services (AIGA, quoted in Berridge, 2006) for being an 'integrative practice of design' (Jackson, 2000, quoted in Berridge, 2006:160). More importantly, value is intentionally created and not added in this 'network economy' where meaning is "the only true currency" (Grefé, 2000:4). Designers are 'enablers of experiences' by nature for their obsession with the material culture, the entire surrounding of an object (Press and Cooper, 2003), or in this case, the cycle of experiences. Also, experience designers should have the needed combination of knowledge from various disciplines as required in this argument (Grefé, 2000). Working consistently on the link between experience and design allows working on a framework for creating and developing event experiences (Berridge, 2006), and this model sets the basis for such a process; design and experience meet here at all phases.

CONCLUSION

The importance of experiences in events was highly recognised; but there was a general lack of understanding as to how consumer experiences emerge (e.g. the dialect relationship between

context and cognitive activities). This lack of understanding has probably limited the extent to which events achieved their potential in creating experiences. In practice, clients clearly were the focus in an event project for a majority of agencies. This is evidenced by the process of project management, especially in the initial and evaluation stages, where key decisions heavily relied on a client's input, not directly informed by guests' experiences.

Design was considered important and the value of design in experiences was acknowledged, but in terms of how it contributes to experiences, the level of understanding varies. Only one agency recognised the symbolic value of design to guests, which is core in consumer experiences. The remaining agencies focused on the imagery side of design, which is external to consumers. Therefore, it appears that design was not considered directly connected with experiences by these event agencies. Also, designers in events were recognised as executers and not constant assets to event projects. In the literature, design is seen as strongly linked with experiences and thus with events, especially by considering experience design as the main means to achieving experiences in events (Pine and Gilmore, 1998; 1999). If the process of design within events is to design 'holistic cycles of experience' as suggested by Press and Cooper (2003), it appears that agencies are not pursuing this process, as designers only participate in limited stages of an event project.

Interestingly, the agency who demonstrated a higher level of conception of experiences and a more experience-oriented project management process (especially in the developing proposal and evaluation stages), also recognised the value of design in enhancing consumer experiences. This agency has the longest history in event industry and has produced most high-impact events worldwide. Although it is not the focus of this study, it is wondered whether the success of this agency is attributable to its' focus on experiences, or vice versa.

The proposed model suggests a shifting agenda from creating an event to designing experiences. Although it is at an early stage of development and is subject to further debate, the proposed shift of focus represents a starting point for future research into the value of design and experience in event projects, and the development of a new perspective on design within events that focuses on experience (thus guests), changing the work relationship between clients and guests.

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THE TYPOLOGY OF PSS BASED ON DESIGN ATTRIBUTES AND USER INVOLVEMENT

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The importance of Product-Service System (PSS) is becoming greater, but there are not many studies based on this topic from a design perspective. This paper will therefore focus on understanding the characteristics of PSS through design attributes, and identify the changes in the design attributes, whether there is a beneficial effect of combining the product and service as in PSS. Also, this paper addressed the relations between the product and service, and the characteristics of Product and Service according to its users' involvements. To categorize the PSS, professional designers selected the design attributes from the collected case studies. Seven design attributes were selected which were grouped with similar attributes. Afterwards, they were positioned on a quadrant with two different area on each axis, 1) inter-dependency between product and service, and 2) users' involvement. Each sector has different features by using the service behavior of users'; 1) Creator 2) Interaction between service provider 3) Receiver 4) participant. This typology could be used as designing constructive PSS by users' involvement.

Keywords: Product-Service System; Design attributes; User involvement

INTRODUCTION

According to the research of OECD, instead of manufacture, the trend of the industry is leaning towards service (Cook, Bhamra, Lemon, 2006). As a result, the companies focusing on manufacture are also having their products joined with services to gain greater profit. The importance of Product-Service System (PSS) is growing greater, and is studied vigorously nowadays, but in the design area, it is not yet actively studied. This study will deal with PSS from a design point-of-view, focusing on what characteristics they have (Morelli, 2002). Furthermore, this study will focus on informing what PSS characteristics in which design strategy to develop a more effective PSS. The definition of PSS and current classification structures were established by literature review. Moreover, this research is to identify significant design attributes of PSS from design experts and to classify PSS samples by priority attributes. In addition, to establish analytic framework, PSS types were positioned on the dimension. And the most crucial research aim is to analyze the characteristics of the PSS types on the taxonomic dimension.

Research Methods

This study is composed of two sections; 1) A literature review to define PSS, to select boundary of PSS in this research, and to analyze of categorization in the PSS in the current study 2) Workshops to identify the design attributes of their priority. In addition the design attributes and the priority of attributes were identified by the third times of empirical research;

- The Generative workshop; to identify design attributes through thirty cases of PSS
- Reductive workshop; to define more significant design attributes
- Evaluative Workshop; to divide the types of PSS and identify the characteristics of each type

In addition, focus group interview were conducted in each workshop in order to understand the in-depth meaning.

WHAT IS PRODUCT-SERVICE SYSTEM (PSS)

1.1 PSS FROM DIFFERENT PERPECTIVES

As the importance of Product-Service System is growing larger, more studies in this area are prospering. Some define PSS as a tool to expand the market, and others define it as the sustainability of the product relating with the life cycle of the product and its services. Generally, PSS is defined as the combination of products and service to satisfy the users' or consumers' needs (Vezzoli and Wimmer, 2005, Cook, Bhamara and Lemon, 2006). Another perspective is that the service is used as a method to sell the product and relate it with customers' needs (Goedkoop, 2007, Tukker and Tichner, 2006). The other perspective of PSS is the focus on sustainability, which is a way of prolonging the lifecycle of product (Rocchi, 2005, Mnzini and Vezzoli, 2003).

Especially, Godekoop (2007), Pergande (2012) defined PSS separating the attributes of the PSS into product, service and system.

The individual elements of PSS:

- Product: a tangible commodity manufactured to be sold
- Service: an activity done for others with an economic value and often done on a commercial basis.
- System: a collection of elements including their relations.

Generally, PSS is defined as the combination of a general product and service with an interaction between the two. Also from previous studies the strong point of PSS is that, as combined product and service, it creates better benefits, making the lifecycle of the product longer. Also users' need is an important component of PSS.

1-2. THE DEFINITION AND CONDITION OF PRODUCT-SERVICE SYSTEM IN THIS RESEARCH

Product-Service System was seen in a critical selling point in business or a way to extend products life cycle. However, there is lack of the design perspective in PSS. In design point-of-view, PSS can be defined as a tool to improve the value through combining product and service, which the user involvement is considerable attribute to reflect users' need. Therefore PSS is crucial in order to plan product and service simultaneously. To do so, analyzing of design attributes of PSS is the first step. Furthermore, from this study when designing the combination of product and service, significant design attributes for a better strategy in actual design practice will be dealt. In addition, since the combination of product and service enriches people's lives, the perspectives of its users cannot be ignored. Because of the characteristic of service; intangibility, perishability, inseparability, simultaneity (Barich, Kotler, 1991), users and services cannot be separated. That is why the typology by interaction between service and user is dealt with in this study.

As a result, a comparison of design attributes between the separate product and service is needed, as well as the comparison of the combination of the product and service. In this study, the boundary condition of PSS for the research was defined as the four following criteria;

- Combination of product and service
- Mass-production of product
- Exception of interaction between human and human, within the service sector
- Multi-national cooperation

The cases of PSS, which suit for this study, had to be selected before conducting the workshops. The case of PSS was gathered, and thirty cases were selected that matched the four criteria. The product should have mass-productive character so people can easily experience the product physically. The service has intangible feature so people experience the service that needs physical evidence, which can change intangible into tangible. And there are front and back stages in

service. The back stage, which has not enough interaction with customer, is ejected. Interaction between human and human at the front stage is also excluded in this research because there are unexpected variables, which are difficult to measure and analyze the interaction among people.

CLASSIFICATION CRITERIA

2.1 CATEGORIZED ACCORDING TO VARIOUS STANDARDS

Product-Service System is defined in many fields with various perspectives, and is being categorized according to various perspectives. This study will focus on the categorization of the perspectives in business model, formation of a group, categorization according to the service characteristics, and the degree of service innovation.

Various classifications of PSS have been proposed (Dehrend et al., 2003; Brezet et al., 2001; Zaring et al., 2001). Most classifications make a distinction between three main categories of PSS. Especially, the categorization of Brezet et al. (2003), Cook (2004) divided PSS into three types, Product oriented, Use oriented, and Result oriented. These have the meaning of:

- Product oriented PSS: Addition of Product usability service in current product
- Use oriented PSS: Rental service
- Result oriented PSS: Service of adding better value in product use

Tukker (2004) divided the three types into eight, categorizing PSS according to the types of services providing the position of product ownership. The categories are;

- Product related
- Advice and consultancy
- Product lease
- Product renting/sharing
- Product pooling
- Activity management
- Pay per service unit
- Functional result

There are several studies applicable in the typology of PSS; service specificity (Mathiue, 2001), market growth, and market share (Hambrick, MacMillan, Day, 1982).

Mathiue (2001) established typology of PSS along to service specificity and Organizational intensity;

1. Service specificity

- A: Upgrading the quality or usability as in customer service that companies provide (Upgrading the noise of the mobile phone).
- B: Add-on services attached to the existing product (roles as distinctive product, can be possibly sold alone)
- C: Service that can be sold alone (roles as distinctive product, can be possibly sold alone)

2. Organizational intensity

- X: business marketing mix; in detail, meaning the specific action in the product mix
- Y: Core value of the company or no changes in the vision but adding onto the portfolio, increasing the prospect.
- Z: Change in the core value, vision, and fundamental characteristics of a company

Another related research is that the degree of innovation is one of the standards to classify PSS. The matrix of Boston Consulting Group (BCG) is a suitable tool to find the object of PSS. The categorization according to its degree will be studied through the BCG matrix (The division

according to the market growth and the occupied portion in the market, which has four different areas - star, dog, cash cow, and question mark) to consider the combination of the product and service when the company is applying into a certain business or a certain product.

Previous studies about typology of PSS explained that PSS could be classified in attributes or perspectives. However, there is a lack of the typology of PSS in design point-of-view is barely seen. So to classify PSS in design attributes can contribute to design Product-Service System according to the characteristics of PSS. The definition and classification of PSS in previous research emphasized on fulfilling users need and analyzing various combinations of product and service. This is way the design attributes is one of the classification condition in PSS in this study. In addition, co-relation of product and service that are component of PSS and user involvement, which can raise users' need, are important issues in design perspective.

2-2. THE TYPOLOGY OF PSS BY INTER-DEPENDENCY AND USER INVOLVEMENT

The three ways of categorization are based on a business model and the characteristics of service having a PSS categorization system. From those studies, not only relations between product and service but also the characteristics of service are important issues to classify PSS. However, those previous research neglected the important components of PSS; User. If PSS focus on understanding the users' needs and the users' involvement, it will make better value than when it is excluded. The typology by users involvement should be considered as one of the criteria since it is an important aspect in the actual use of the combination of the product and service. In order to make PSS constructive and useful to users, it is important to analyze the design attributes, which decide the feature of PSS. Therefore, in this research, the cases of PSS will be categorized by their design attributes which represent their character, and the types will be analyzed by two points-of-view; 1) inter-dependency between product and service and 2) the types of user involvement.

THE DESIGN ATTRIBUTES OF PSS

To identify design attributes of Product-Service System, three empirical experiments were conducted. The Generative and Reductive workshops were conducted to identify the most considerable design attributes from the cases of PSS. The Evaluative workshop was for classifying PSS samples by priority attributes. According to the results, the analytic framework of PSS was made. The Generative workshop was conducted to identify design attributes through thirty cases of PSS. To define more significant design attributes among the Generative workshop, Reductive workshop was conducted. Evaluative Workshop was for dividing the types of PSS. The framework was composed according to the user involvement and inter-dependency of PSS. The types was positioned in four quadrants and analyzed by the characteristics of each type. In addition, focus group interview as conducted in each workshop in order to understand the in-depth and possibly understanding meaning.

3-1. GENERATIVE WORKSHOP - EMPIRICAL RESEARCH TO IDENTIFY DESIGN ATTRIBUTES FROM THIRTY CASES

The participants are the professional designers who have experience of three or more years in the current design field. They were asked to judge and select all the related design attributes from the selected thirty cases. Their decision making ability and design skills had fair and professional judgment. To balance the results, individual Focus Group Interviews were conducted to understand what their choices meant. In total, 112 words were extracted through this workshop, and out of the 112 words, 50 were chosen as the representative design attributes as seen in Table 1.

Table 1 50 Design attributes from the cases of PSS

50 Design attributes				
Applicable	Effective	High functioned	Novelty	Uniqueness
Business value	Emotional	Ideal	Practical	Unity

Changed identity	Entertaining	Impact	Perspective shift	Universal
Clear identity	Ergonomics	Improved	Professional	Useful
Co-creation	Expanded	Inexpensive	Rhythm	User –friendly
Compatibility	Expressive	Informative	Safety	Variety
Completeness	Feasibility	Innovative	Social-friendly	Well-arranged
Connectivity	Focus on needs	Manageable	Sustainability	Well-balanced
Donation	Harmonious	Multi-functioned	Symbolic	Well-matched
Eco-friendly	Hierarchy	Non user friendly	Trendy	Well-organized

3-2. REDUCTIVE WORKSHOP - FOCUS GROUP INTERVIEW TO DETERMINE SIGNIFICANT DESIGN ATTRIBUTES FROM CASES

From the Generative workshop, 50 design attributes were extracted from the thirty cases. In order to understand the related design attributes, the Reductive workshop was conducted. The workshop participant selection criteria were identical with the first workshop but different participants took parts in the Reductive workshop. The participants were asked to select the closely related design attributes from the list of fifty words (Table 2) relating it to the shown thirty cases that they are familiar with. The reason why the participants were asked to only use the familiar cases was because selection based on the familiarity would be more accurate than selection of unfamiliar cases. Also for a more accurate result, post evaluation interviews were conducted to understand their underlying meanings of participants' selections. From all the selected design attributes seven of the most frequently occurring design attributes were selected since these attributes are the ones that were used to most frequently express the PSS cases. Seven design attributes of PSS are;

- Well-arranged; Well organization of Product and Service within the system
- Connectivity; Well bond of Product and Service
- User-friendly; Users' Familiarity of the PSS
- Manageable; Users' feeling of less difficulty with the PSS
- Co-creation; Necessitate participation of users
- Clear Identity; Definite recognition of PSS
- Perspective Shift; Change of system surrounding the product due to the PSS

3-3. EVALUATIVE WORKSHOP - TO IDENTIFY THE PRIOR OF DESIGN ATTRIBUTES

This Evaluative workshop used the selected 7 design attributes extracted from the Generative and Reductive workshops. The objective of this workshop is to understand the priority of the design attributes when product stands alone, service stands alone, and when product and service are combined. There were twenty participants who were graduate students of Industrial Design department at Korea Advanced Institution of Science and Technology. For better understanding, some of the cases were provided with explanations that are used on the official homepage of each case.

From the thirty cases, each product, service, and product with service were separated. The participants viewed every image and ranked from one to seven with the provided 7 design attributes. The smaller value of number stands for the more significant attributes. Additionally, Post evaluation interview was conducted as the Reductive Workshop. From the workshop results, various rankings were shown. When collecting all the data, each case's ranking were added which were agreed that the lowest number ranking had the highest relevance with each case.

To analyze the data, three types of methods were considered the third method was chosen to analyze the important design attributes. The three methods are;

1) To pick the top three ranking of design attributes (to using the ranking data.)

This method has a weak point since the value of the first score; the second score or the third had big difference. In that case, despite the fact that the value satisfied the standard, it cannot be said it is an important design attributes.

2) To calculate the average of score and to choose design attributes which are above the average. However, from the selections through this method, over four or five of the seven design attributes were selected. It is hard to say that the priority is accurate.

3) The lowest number (only 1st placed ranking) was selected and had a 150% tolerance range, meaning that every first placed number X 150% can be considered as a significant design attribute(s).

Figure 1 Case example: explanation of Scoring Policy

Case 1: Apple iPod	Well-Organized	User friendly	Manageable	Co-creation	Connectivity	Clear Identity	Perspective Shift
Participant 1	2	4	5	6	7	1	3
Participant 2	5	3	4	7	6	1	2
				⋮			
Participant 19	2	3	4	6	5	1	7
Participant 20	4	3	2	5	7	1	6
Total Score:	**57**	**64**	**75**	**122**	**116**	**A : 40**	**86**

Explanation of Scoring Policy:

A = lowest score = most significant

A X 150% = tolerance range

40X 150% = 60

So, all scores of 40 to 60 are considered significant

Result, ‘Clear Identity = 40’ and ‘Well-Organized = 57’ are the most significant

For accuracy the third method was selected to analyze data from three types of workshop. Through the workshops thirty cases of PSS was classified in eight types. Each type has same attributes although the priority among design attributes is different. The reason to classify PSS according to its design attributes is that the cases share the same design attributes meaning that their characteristics are also the same.

Thus, thirty cases divided into eight types in the table 2 with overlapping design attributes.

Table 2 Eight types of PSS and the attribute

Type	Company	Main Product	Service	Attributes
Type 1	Nike	Trainers	Nike id	User-friendly Clear Identity Co-creation
	Dell	Laptop	Customization	
	KIA Motors	KIA automobile	KIA Design my KIA	
	PUMA	Trainers	Mongolian Shoes BBQ	
Type 2	Apple	i pod, i phone	i tunes	Well-arranged Connectivity Manageable
	Samsung	Zipel smart oven	Smart cooking	
	Nike	Trainers	Nike plus	
	Amazon	Kindle	e-book	
	Lego	Mind storm	Open source	
	Johnson&Johnson	One-touch blood sugar level measuring instrument	OTDMS	
	Nintendo	Wii	Downloads, Update Program, Club Nintendo	
	Microsoft	X-box 360	Downloads, Update Program	
Type 3	Samsung	Smart TV	Webcam chatting	Well-arranged Connectivity Perspective Shift
	Olleh egg	egg	wifi service	
	Olleh TV	TV	Broadcast	
	Korean air	Kiosk	Self check-in service	
Type 4	KIA Motors	KIA automobile	KIA collection kit	Clear Identity

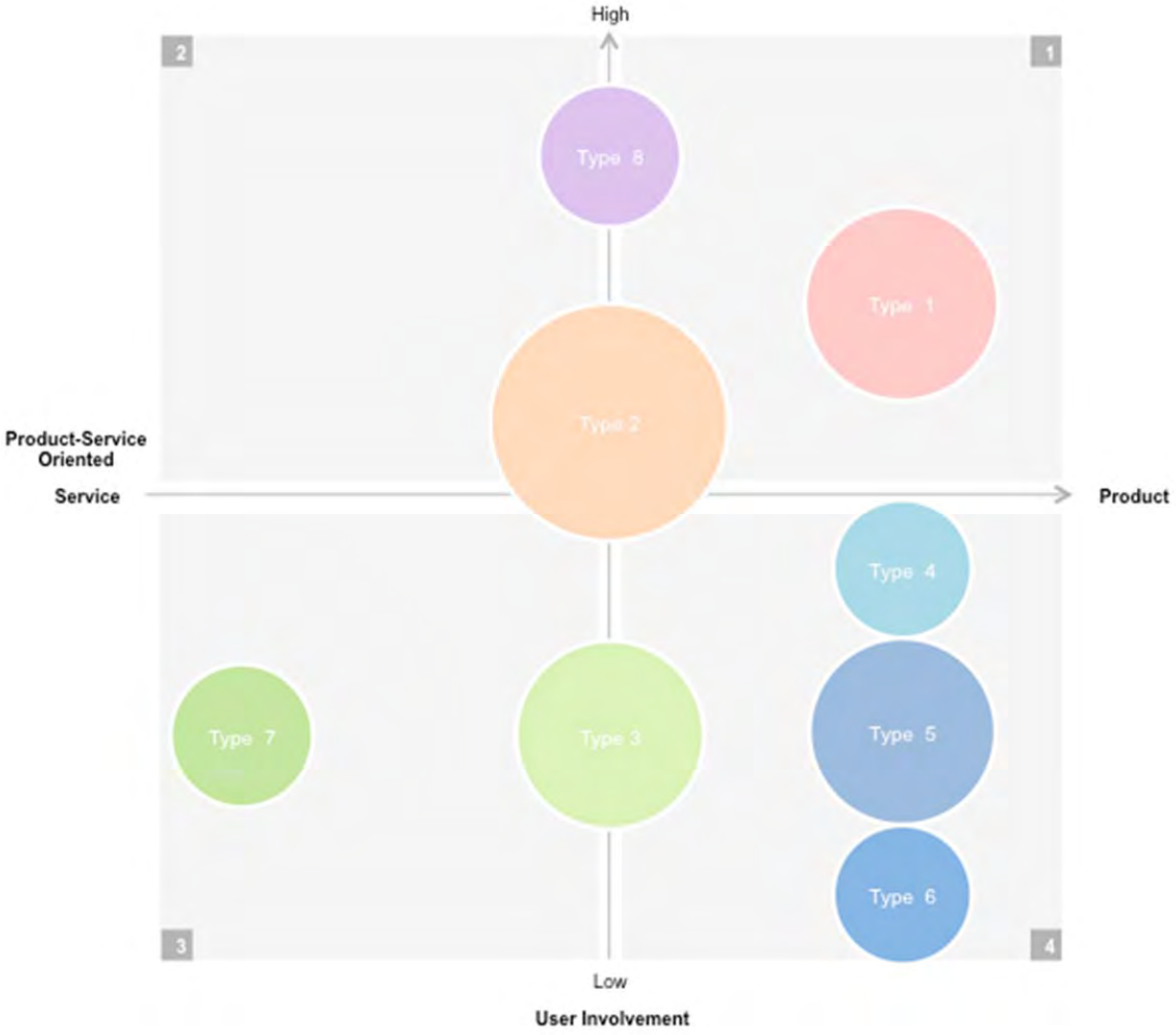
	Starbucks	Merchandizing product	Free Beverage Coupon	
Type 5	Phillips Hangook Tire KIA Motors Clinique IKEA	Lighting Tire KIA automobile Cosmetic Furniture	Software T-station KIA service Q Experience space Experience space	Clear Identity Perspective Shift
Type 6	Toshiba Komatsu Xerox	Lift Heavy equipment Printer	Lift safety service GPS Document system	Perspective Shift Well-arranged
Type 7	Hyudai Card Korean air	Finance service UPIS milk bottle	Finance, marketing methods in-flight service	Clear Identity User-friendly
Type 8	Build-a-Bear Reebok	Teddy Bear Training Kit	Customization Jukari - fly to fit	Manageable Co-creation

3-4. TO ESTABLISH ANALYTIC FRAMEWORK AND TO POSITION PSS

Based on the previous three workshops, eight types (table 2) were created according to the similar design attributes resulting from the third workshop. The types will be positioned on a quadrant with each axis of 1) inter-dependency of the product and service and 2) user involvement, to understand and compare each characteristics of the group. Those two components compose the quadrant since PSS is basically the combination of product and service. That is one reason to determine the characteristics of PSS according to the Product-oriented PSS or Service-oriented PSS. Another important component of PSS is user involvement, which used to raise users satisfaction (Baroudi, 1986, Alam, 2002). Therefore, the cases of PSS, which are classified by design attributes, are re-classified by inter-dependency of product and service and user involvement.

To identify the inter-dependency between the product and service, the launching period of each product and service was compared. This resulted as three types, being product-oriented, service-oriented, or co-oriented. Also the user involvement can be divided into two parts: having a low user involvement or having a high user involvement. Therefore, the axis of the framework was composed as the following; eight groups were positioned, which resulted as the following Figure 2.

Figure 2 The Positioning of eight groups by their characteristics



CONCLUSION: DESIGN ATTRIBUTES IN PSS RELATED TO USER INVOLVEMENT

The eight different types are placed on four quadrant divided by inter-dependency and user involvement. Analyzing the types' design attributes and the characteristics of each axis, each quadrant had characteristics as the following:

1) Creator

- User as the participant in the service. The participation can be reflected on the outcome of the product or it can be reflected on the surrounding of the product.
- Service is usually conducted on an online environment as a website.
- High brand familiarity activates the service.
- Strengthens the uniqueness of the product.
- Service can be changed by intension of user.

2) Interactor

There were no cases for the second quadrant because for service oriented and high user involvement area, since human to human interaction was needed, which was not the focus of this study.

3) Receiver

- To strengthen the image of a service-oriented company.
- Low relevance of Product and Service from PSS

- Understand the underlying needs of the customer and providing with related products.

4) Participant

- Change in system or environment surrounding the product
- Change of image of current product image, aiming for newness
- New opportunity possible since it included surroundings related to the product
- User is matched to the system

To summarize this research, 1) The seven significant design attributes of PSS 2) the analytic framework of PSS, and 3) the analysis of the PSS types characteristics according to the analytic framework were studied.

There are many researches on product alone or service alone but there are not enough research on the combined product and service -PSS focused on design aspect. Accordingly, this study is to understand the design attributes of PSS through empirical research. Since PSS is a combination of the product and service, the relation between them is significant to identify the characteristics of PSS. To understand the hierarchy between the product and service, the launching period and characteristics of the company were seen. Also since the product and service are combined and blended, understanding the users' involvement is important. Therefore, PSS was categorized according to these two attributes. Since the combination structure of the product and service is complicated, each case had their unique point but after analyzing each characteristics of the case, cases with similar attributes were grouped and labeled.

The study can be implied as a technique for understanding the attributes according to the positioning of the PSS, and use the framework when planning a PSS to give an effective direction for user approach.

The major findings can provide in-depth understanding of how PSS is categorized according to the users' involvement from the users' perspective involvement and the relation of product and service.

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A DESIGN APPROACH TO NAVIGATING COGNITIVE TRAPS

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The ability to create and leverage emergent opportunities has become all the more important in contemporary environments characterized by change. Many studies chronicle how firms fall into cognitive traps and fail to capitalize on emergent opportunities. Few studies theorize about how firms can navigate such cognitive traps by harnessing projects as a basis for opportunity creation and ongoing organizational transformation. In this paper, we track a specific project at Google that led to new products, a new business model, and a programming technique, all of which led to new capabilities that resulted in transforming the company. Our analysis reveals three core processes that form the bases for an emergent "design approach", one that lies in contrast to the traditional "design school" that Mintzberg had critiqued. We conclude with observations as to how the new design approach can help firms navigate cognitive traps.

Keywords: Design school, Design approach, Cognitive traps.

INTRODUCTION

Organizations, although forums for accomplishing results that are well beyond the reach of individuals, are nevertheless vulnerable to traps. Such vulnerability is readily apparent in the many studies that have chronicled how and why organizations fall into traps by failing to navigate changes in their environments (Benner, 2010; Christensen, 1997; Kaplan, 2008; Tripsas, 2009). While research has identified a multitude of sources - such as routines and core rigidities (Nelson and Winter, 1982; Leonard-Barton, 1992), competency traps (Levitt and March, 1988), and disruptive technological shifts (Christensen, 1997) that underlie traps - the one that has received much attention recently centers around managers' cognitive constraints (Huff, Huff, and Barr 2000; Kaplan, 2011; Walsh 1995). In particular, given that decision rights lie with managers and given that they have cognitive constraints, appropriate capabilities may not be deployed to operate in new environments (Tripsas, 2009) or to leverage and benefit from existing ones (Kaplan, 2008; Tripsas & Gavetti, 2000).

These findings are consistent with observations offered by Mintzberg (1990) in his critique of what he labeled as the "design school" to strategy-making. Three facets of the design school stand out. First, agency rights are concentrated among a few at the top. Second, top managers take decisions based on choices presented to them from a pre-given set of alternatives. And, third, such decisions and choices are based on a separation of cognition from capabilities ("thinking" from "doing" in Mintzberg's (1990) terms). Mintzberg noted that a strategy process based on the cognitive capacities of top managers guided by local search heuristics is bound to come up short eventually, especially in dynamic environments. In the parlance of today's literature, traps are

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inevitable because cognitions of top management teams constituted by deeply held beliefs, assumptions and commitments, are slow to change and therefore can lead to a failure in recognizing fundamental environmental shifts (Barr, Stimpert, & Huff, 1992; Bouchikhi & Kimberly, 2003; Kaplan & Tripsas, 2008).

Consider a recent failure. Research In Motion (RIM), the firm that makes and markets Blackberry, once the industry leader and standard, has plummeted in its leadership position and is now fighting for its survival. A Wall Street Journal article notes "According to interviews with more than a dozen former RIM executives and industry executives who worked closely with the company, it was a blinding confidence in the basic BlackBerry product that was at the root of RIM's current troubles" (Connors, 2012). Similar issues abound in other contexts. Nokia, also once the leader in the mobile handset market is now struggling to keep up with the innovations happening in the smartphones market. Sony, the developer of Walkman and once a leader in the portable music player market was not able be create something similar to an iPod, despite having the needed resources and capabilities to produce one. Polaroid and Kodak were not able to create something similar to an Instagram – a photo sharing application whose "personality and style were developed in some way from old film camera companies. The application's filters that convert pictures to look like snapshots from yesteryear were inspired by classic Brownies and Instamatics and disposable point-and-shoots" (Bilton, 2012).

But, for all these examples of failures, there are many other examples of firms that have been able to avoid falling into traps that threaten their survival (for e.g., see Burgelman, 1994; Garud, Kumaraswamy & Sambamurthy, 2006). These examples and others suggest that there must exist systematic mechanisms for allowing firms to avoid and navigate cognitive traps. How then can we explain these counter examples and what can we learn from them?

To address this question, we draw upon an alternative literature on design that has been gaining traction in the past few years. Not to confuse it with the "design school" that Mintzberg critiqued, we will simply use the term "design approach" following the lead of several scholars (Boland & Collopy, 2002; Hatchuel, 2001; Liedtka, 2000; Romme, 2003). At its core, such an approach is based on a set of drivers that are different from the ones driving the "design school". For instance, cognition and capabilities are co-activated in such a perspective. A reason for this is that new options emerge in and through action (Schon, 1984). Moreover, agency rights are distributed across the organization such that they lie at the "scene of the action" rather remain concentrated at the top.

Although this perspective is still nascent, several scholars have been advocating a design approach for innovation and strategy-making (Boland and Collopy2004; Liedtka, 2000; Martin, 2009; etc.). Despite such calls, there are few studies that have examined how exactly such an approach applies to organizations in helping them avoid and navigate cognitive traps. This is what we set out to accomplish in this paper by conducting a revelatory case study (Yin, 1994) of a company that has by all measures avoided falling into traps in a fast-paced environment – Google Inc. Starting as a search engine, Google has now become transformed into a platform of products and services that range from web browsers to mobile operating systems.

Publicly available data underscore the important role that ongoing projects have played in facilitating this transformation. This is not surprising given that projects are a way to distribute agency rights to those who are most knowledgeable and who generate options in and through actions (Dougherty & Hardy, 1996; Garud, Gehman, & Kumaraswamy, 2011; Martin, 2009; Yoo, Boland & Lyytinen, 2006). The one that we study in this paper is *Project Caribou.* Its origins can be traced to processes at Google that results in the ongoing generation of ideas in action, some of which become projects that have the capability to transform the company itself. *Project Caribou*, for instance, resulted in new products (*Gmail* and *AdSense*), a new business model (*contextual advertising*), and a new programming technique (*AJAX*), all of which have led to new capabilities and have transformed the company over time.

Our analysis of Project Caribou highlights three interrelated mechanisms that helped Google navigate cognitive traps. These include what we label as: *temporal structuring, mutual engagement* and *prototyping*. By temporal structuring, we mean organizational arrangements that encourage employees to explore new opportunities even as they go about their day-to-day activities. By mutual engagement, we mean opportunities for employees to share and amplify their ideas with others within and outside the organization. And, by prototyping we mean opportunities to concretize nascent ideas through the development and deployment of artifacts that probe environments even while shaping them.

THEORETICAL BACKGROUND

To motivate our inquiry, we begin by briefly reviewing what Mintzberg (1990) referred to as the "Design School" - where agency rights are concentrated in top management teams who make choices from a given set of alternatives, and where such cognitive processes are distanced from the capabilities to execute the strategy that emerges. While the Design School may be useful in a stable environment, its utility comes into question when organizations confront ongoing disruptive technological shifts and fundamental institutional changes (Christensen, 1997). In these situations, the very tools embraced by top management to enhance the efficacy of their information gathering and decision-making processes can generate an illusion of control, leading to cognitive traps.

THE "DESIGN SCHOOL"

It was Mintzberg (1990) who coined the phrase "Design School" to critique a linear, top-down approach to strategic planning and execution within organizations. While he explicates several different facets of the Design School, three stand out -- (a) the concentration of agency rights in the hands of a few at the top of the organizational hierarchy, (b) choosing from a set of pre-given alternatives, and (c) the separation of cognition from capabilities. As this is well-trodden territory, we only provide a brief discussion of these issues so as to provide the basis for how and why cognitive traps are likely to emerge for organizations that embrace such an approach.

Concentrating agency rights. The Design School approach argues for concentrating agency rights in the hands of top management teams. For instance, the right to decide upon the strategic direction of the company, including the needed capabilities that the firm should develop in the future, is posited to lie in the hands of a select few managers who are at the top of the organizational hierarchy. The role of these top managers, then, is to construct clear-cut goals and standard operating procedures for their sub-ordinates in the lower rung to execute. Even though these subordinates might have certain agency rights, these rights are only delegated. And this delegation too is done in highly restrictive ways (Baker, Gibbons & Murphy, 1999). Incentives are also aligned in line with responsibilities by ensuring that residual control lies with actors who bear the residual risk (Fama & Jensen, 1983; Jensen & Meckling, 1976). Top managers, thus, serve as fiduciary agents of shareholders who eventually are the ones who bear the residual risk. In turn, these top managers have others who act as their agents. In this way, agency rights are always concentrated in the hands of a select few people.

Choices from a pre-given set of alternatives. Besides the concentration of agency rights in the hands of top managers, this approach to governance is also premised on the assumption that top managers scan, search and interpret the information from the environment to decide and make choices from a given set of alternatives to a known set of problems (Boland & Collopy, 2004; Hatchuel, 2001)*. Changes in the environment bring forth a "known" set of problems for which a "given" set of alternatives pre-exist. The role of top managers, then, is to apply a "satisficing" criterion (based on their past experience) to scan, filter and interpret information available from the environment, and to choose among those alternatives. Given bounds to rationality and the costs of information gathering and processing, not all information will be considered. Typically, top

* *Boland and Collopy (2004) refers to this as "decision attitude" to draw attention to a sizeable literature in management that is premised on actors making choices from alternatives to a given set of problems.*

managers “satisfice” (Simon, 1955) – that is, they selectively search and choose the first most acceptable alternative. In this task, they employ cognitive frames and mental models (Kiesler & Sproull, 1982) to selectively scan, filter and interpret the information from their environments (Eggers & Kaplan, 2008; Porac, 1997), and use search heuristics to list, evaluate and decide from a set of choices (Cyert & March, 1963 [1992]; Dosi, Nelson & Winter, 2000; Gavetti & Levinthal, 2000).

Separation of cognition from capabilities. A hallmark of the Design School approach is the separation of cognition from capabilities (Laamanen & Wallin, 2009). As Mintzberg (1990, p.182) noted, the Design School promotes “thought independent of action, strategy formation above all as a process of conception, rather than as one of learning”. That is, at any level of the hierarchy, it is the principal who decides and the agents who execute. Within such an approach, capability building occurs through a process of heuristic search (Dosi, Nelson & Winter, 2000) based on managers’ past experiences and beliefs resulting in a listing and evaluation of possibilities to facilitate a choice (Nelson & Winter, 1982). Plans and strategies flow downwards given that top management has an overview of what is happening across the corporation and can coordinate disparate activities. Incentives for agents and the monitoring of their activities by principals ensure conformity to plans. Deviations from plans filter up to top management for corrective actions, and any residue is but a cost to be borne.

LIMITS TO THE DESIGN SCHOOL APPROACH

Such an approach can be effective in stable well-defined environments where technologies, customer preferences, and institutional mechanisms have already emerged (Boland & Collopy, 2004; Fredrickson & Iaquinto, 1989). This is because the parameters within which choices have to be made are known and have stabilized, thereby providing top management an overall framework to make decisions. Indeed, by setting an overall administrative agenda to help shape decisions, top management can gain control of a complex enterprise (Bower, 1970; Burgelman, 1994).

However, the Design School starts breaking down in dynamic environments (Bourgeois & Eisenhardt, 1998). The advent of disruptive technologies represents one such situation (Christensen, 1997). On these occasions, it is not possible for managers to fully comprehend a changing situation and take real-time decisions about critical issues based on known categories of problems and alternatives. For instance, top management not involved in new initiatives may be unclear as to whether some emergent data ought to be considered as signal or as noise (Garud, Dunbar & Bartel, 2011). It is not even clear what relevant information one can meaningfully codify when customer preferences and institutional structures have yet to stabilize. Moreover, managers’ assessment of organizational “strengths generally turn out to be far narrower than expected and weaknesses, consequently, far broader (Mintzberg, 1990, pp.182-183). To the extent that there is any prescience about what may be happening, it lies with those in the field (an argument similar to the “man on the spot” offered by Hayek (1945)). But, these actors may not be able to codify their tacit knowledge (Polanyi, 1962), finding it easier to generate more and more data about known categories (Dunbar & Garud, 2009; Hayes and Abernathy, 1980). Worse, an attitude by top management that relies on making choices from a given set of alternatives to a known category of problems can even dampen the emergence of ideas that potentially could have prevented an organization from falling into traps. As Mintzberg (1990, p.184) noted, such an attitude become “blinders designed to focus direction and so to block out peripheral vision” thus impeding “strategic change when it does become necessary”.

It is no wonder that a number of studies have documented and theorized about the organizational pathologies of this approach (Benner, 2010; Christensen, 1997; Mintzberg, 1990) and the cognitive traps they can generate (Kaplan, 2008; Tripsas & Gavetti, 2000; Tripsas, 2009). For instance, Tripsas and Gavetti’s (2000) study of Polaroid illustrates how top managerial beliefs and assumptions constrained the company’s efforts to transit from analog to digital imaging technologies. Specifically, Polaroid’s efforts to develop and deploy capabilities for digital imaging

shaped by prior company's managerial beliefs and assumptions based on the "razor/blade" monetization model turned out to be incongruent with the needs of a digital era. In another longitudinal study, Tripsas (2009) illustrates how the managerial commitment to a particular organizational identity hindered its capability building. Linco's (the pseudonym of a company she studied) identity as a "digital photography company", though a source of strength during early stages of emergence, later became a liability as the company encountered an architectural innovation in flash memory. Linco failed to capitalize on the commercial potential of this innovation because members initially did not notice the value of this 'identity challenging' technology and, subsequently, did not pursue initiatives to address this threat even after becoming aware of its imminence. In other words, the company was cognitively trapped.

Performing Traps. These observations and examples suggest that concentrating agency rights in the hands of top managers who make choices based on their pre-existing beliefs and assumptions that are separated from capabilities is ill equipped to generate, evaluate and exercise options that emerge in and through the activation of capabilities. To overcome these problems, many organizations have embraced ever more powerful tools for information gathering that are aimed at strengthening managerial cognition (Cabantous & Gond, 2011). The incorporation of such tools, while useful in well-defined stable contexts, serves only to lull top managers into an illusion of control (Langer, 1975) during situations of change, engendering "a false sense of understanding" (Mintzberg, 1990, p.184). Moreover, rather than serving as the basis for informed cognition in action, the use of such tools ends up distancing managers farther away from what is happening 'on the ground' (Hayes & Abernathy, 1980), trivializing and distorting "the subtle needs of a complex organization" (Mintzberg, 1990, p.184).

It is not surprising that Fredrickson & Mitchell (1984) reported a negative relationship between the 'comprehensiveness' of strategic decision processes of a firm operating in an unstable environment and its performance. In an extension of this study, Fredrickson & Iaquinto (1989) noted that comprehensiveness in strategic decision processes generates considerable inertia, and that a "creeping rationality" becomes deeply ingrained into the very fabric of the organization. In short, existing tools, techniques and approaches that are used to strengthen managerial cognition paradoxically "performs" the very traps that it seeks to avoid.

These studies suggest that searching for insights to addressing the problem of traps using a theoretical approach that posits managerial cognition as the driver of firm capabilities is not likely to yield the necessary insights. The solutions that are likely to emerge will be limited by the fact that they are based on the same theoretical foundations that generated the problem in the first place. It is for this reason that scholars have critiqued this approach by noting that it dampens emergent strategies (Burgelman, 1984). Variously known as "logical incrementalism" (Quinn, 1978), and "science of muddling through" (Lindblom, 1959), such emergent strategies are generated in action (Starbuck, 1983) and made sense of retrospectively (Weick, 1995). Indeed, as Brunsson (1982) noted, organizations may operate as much on the basis of "action rationality" as they do on the basis of "decision rationality".

All these scholars suggest the importance of injecting streams of novel action into ongoing organizational work. This requires paying attention to several facets. First, agency rights have to be distributed all across the organization so that those at the scene of action are able to explore and amplify creative inputs that emerge as they work. Second, alternatives should not be considered as pre-given, but instead, must be actively created on an ongoing basis. Third, cognitive structures alone should not be given primacy and be allowed to dictate capability development and deployment. Instead, cognition and capabilities should be co-activated together via reflection in action, allowing for the recognition of new opportunities and the ongoing emergence of new options that could crystallize onto choices. These elements represent the new design approach (Boland & Collopy, 2004; Hatchuel, 2002; Jelinek, Romme, & Boland, 2008; Liedtka, 2000; Pandza & Thorpe, 2010; Romme, 2003).

But how does such an approach play out in organizations to reduce the possibility of firms falling into cognitive traps? To gain an understanding of such possibilities, we examine Google, a company that that promises to yield insights. What attracted us to this research site is Google's ongoing transformation from a search engine to a platform of products and services even as it has continued to perform over time in a dynamic environment. Google promised to offer insights as to how organizations may navigate cognitive traps.

METHODS

Following a rich body of research in management that has conducted in-depth analysis of exemplary revelatory cases to generate theory (e.g. Burgelman, 1991, 1994; Danneels, 2011; Joseph & Ocasio, 2012; Rosenbloom; 2000; Siggelkow, 2002; Sull, 1999, Tripsas and Gavetti, 2000), we too conducted an inductive, qualitative analysis of Project Caribou at Google. Qualitative analysis is particularly useful to generate an understanding of a phenomenon by coming up with more analytical distinctions (Tsoukas, 2009) and nuanced insights (Sutton & Hargadon,1996). Revelatory case studies of exemplary organizations are particularly useful to generate new insights that can then serve as the basis for theory generation (Yin, 1994).

The exemplary company we chose to study in this paper is Google Inc., a company that many consider to be one of the most innovative companies in the world (Businessweek, 2010; Fast Company, 2010; Hamel, 2010). Initially, Google's identity was around search -- its very name becoming synonymous with 'web search'. In fact, it is one of the few organizations whose name has been added as a 'verb' in the Oxford English dictionary and the Merriam-Webster collegiate dictionary. To 'google it' refers to using a search engine to obtain information on the World Wide Web. Now, the company has become a platform of products and services ranging from voice telephony to mobile operating systems. Gaining an appreciation of the processes that underlie this transformation promised to yield insights as to how firms might navigate traps.

At Google, projects serve as key focal points for harnessing and implementing new ideas into valuable products and services. This is consistent with the observations of a number of past studies that have chronicled how projects are key drivers of organizational change, renewal and transformation (Dougherty & Hardy, 1996; Garud, Gehman, & Kumaraswamy, 2011; Martin, 2009; Yoo, Boland & Lyytinen, 2006). Projects are the basis for the exploration and creation of new business opportunities. Moreover, projects serve as forums for action and interactions among a diverse set of organizational actors and occasions for the emergence, formation and transformation of beliefs, routines, and practices (cf. Ravasi & Lojacono, 2005). They draw from organizational resources while simultaneously transforming them.

This was true of Google's Project Caribou that we studied. While drawing upon companywide resources across Google, Project Caribou generated a set of products, processes and services that deviated from the company's identity as a 'search engine', eventually resulting in transforming the organization. Studying Project Caribou held the promise of unearthing mechanisms whereby organizations may be able to navigate traps.

DATA COLLECTION

Our analysis is based on considerable data on Google from multiple publicly available sources (close to 600 assets in all). These include trade press and business press articles on Google, academic case studies on Google and Google products, official Google product blogs, personal blogs of Google employees, audio and video interviews of Google's executives, product managers and employees, annual reports, Securities and Exchange Commission (SEC) filings, industry reports from Gartner, Forrester, IBIS World, International Data Corporation (IDC), S&P's NetAdvantage and more. We collected our data by following guidelines offered by past studies that employed publicly available materials for qualitative analysis (e.g. Danneels, 2011; Joseph & Ocasio, 2012; Garud, Jain & Kumarawamy, 2002; Rindova & Kotha, 2001; Van de Ven & Poole, 1990).

We gathered publicly available longitudinal data on Project Caribou as well the context within which this project unfolded – i.e. Google as an organization and the industry within which it was operating. At the project level, we gathered data from a variety of sources, including, official product blogs and personal blogs of the actors involved in the projects. Reading these blogs, and listening to the recorded audio and video interviews of the actors involved with Project Caribou served as a proxy for direct observations and interviews. We also gathered detailed pre-launch screenshots of Gmail that helped us understand the project's trajectory from the time of its inception till its public launch.

At the organizational level, we gathered publicly available information from different archival sources including a complete set of annual reports, reports from financial analysts, SEC filings, several academic case studies (Edelman & Eisenmann, 2010; Groysberg, Thomas & Wagonfeld, 2009; Hamel & Breen, 2007; Hild & Mitchell, 2004; Hill & Stecker, 2010; Iyer & Davenport, 2008; Meister & Mark, 2004; Moon & Chen, 2007), and books written about Google's history, culture, and work practices (Battelle, 2005; Girard, 2009; Stross, 2008; Vise & Malseed, 2006). We used the databases ABI Inform, Business Source Premier, Lexis-Nexis Academic, and Information Sciences Abstract to identify articles on Google using a combination of keywords "Google", "Google Inc.", and "GOOG". These press releases offered a chronology of events in Google's history. We also benefitted from the extensive prior historical work (for example, Battelle, 2005) and video documentaries on Google. In addition, Google has made publicly available a vast array of self-reported information, including the company's organization chart, articles and videos on their work culture and practices as well as technical papers that highlight some of their internal processes and infrastructure.

At the industry level, we gathered reports from Gartner, Forrester, IBIS World, International Data Corporation (IDC), S&P's NetAdvantage. Specifically, we looked for data that would help us understand the technological field following the dot-com bubble burst when Project Caribou took shape. We looked for information concerning how members of the Internet industry thought that the industry would progress. We also gathered information on the popular programming tools and frameworks of the time and the shared beliefs held by technology analysts and experts on the potentials of those tools and frameworks and their thoughts about the future of the web and web programming.

These data allowed us to view the phenomena of interest from multiple vantage points. For instance, press releases, top managers' interviews, documentaries and case studies on Google presented us with a broad understanding of the processes followed within Google, while unofficial blogs and interviews of Google employees offered us with a more nuanced view of such processes. Audio interviews of the Product Manager of Project Caribou complemented the interview accounts and blog posts of Project Caribou's Technical Lead. These accounts, when put together, generated a rich understanding of Google's internal processes. Similarly, industry and investment analyst reports complemented the press reports from Google concerning how Google perceived the market after the dot-com bubble and the subsequent actions it undertook.

DATA ANALYSIS

We analyzed the data by following the steps laid down by Miles & Huberman (1984) in their primer on qualitative research. We started by reading the corpus of data that we had gathered to gain an overall longitudinal perspective about Project Caribou, the company, and the industry at large (Please See Table 1 for a broad chronology of events describing the company). As we read these materials, we used a process of "initial coding" (Charmaz, 2006) to identify themes that were relevant to our research question. These themes drew our attention to missing pieces of data that then led to additional rounds of focused data collection, coding, and analysis.

Table 1. Abbreviated Chronology of Key Events at Google

Year	Description
Mar 1996	Larry Page and Sergey Brin start working on the Stanford Digital Library Project (SDLP). Begin collaborating on a search engine called "BackRub".
Sep 1997	Page and Brin decide to take Backrub online. They name it "Google" and the domain name "google.com" goes online.
Aug 1998	Google gets its first funding -- a contribution of US$100,000 – from Andy Bechtolsheim, the co-founder of Sun Microsystems
Sep 1998	Google Inc. was incorporated at a friend's garage in Menlo Park, California. A fellow Ph.D. student, Craig Silverstein, was hired as the first employee
Dec 1998	Google indexes about 60 million pages. "PC Magazine" names Google as the 'search engine of choice' for 1998.
Jun 2000	Partnership agreement with Yahoo! to become its default search provider. Google indexes more than 1 billion web pages.
Oct 2000	Google AdWords launches with 350 customers.
May 2000 – Aug 2001	Dot Com Bubble Burst
Aug – Sep 2001	"Project Caribou" kick-off. Used JavaScript + xmlHTTPRequest for building the email application.
Mar 2003	Google announces a new content-targeted advertising service – a spin-off product from "Project Caribou" -- that lets publishers access Google's vast network of advertisers.
Apr – Jun 2003	Google acquires Applied Semantics. Integrates the "content-targeted" advertising service (i.e. "AdSense for Content") with the technology from Applied Semantics to start a new advertisement service named, "AdSense".
Apr 1, 2004	Google's press release on a new email service with 1GB storage, with no pop-up and banner Ads, and with no "delete button".
Aug 2004	Google IPO.
Oct 2004	First Web 2.0 Conference organized by Tim O'Reilly. First signs of revival for the "internet industry" after the Dot Com Bubble burst.
Feb 2005	Google's Jesse James Garrett of Adaptive Path coins the phrase "AJAX". Frames it as a new technique for building web applications.
Apr 1, 2005	Exactly one year after the initial release, Gmail increased mailbox size to 2 GB, advertising it as 2GB plus, and introduced some other new features, including formatted editing which gave users the option of sending messages in HTML or plain text.
Apr 2005	Gmail became available in several languages: British English, Dutch, French, German, Italian, Japanese, Korean, Portuguese, Spanish, Russian and simplified and traditional Chinese.
May 2005	Google launches Google Web Toolkit (GWT) for developing AJAX-based web applications
Aug 2005	Gmail started offering 100 invitations to some users.
Dec 2005	Google released a version of Gmail for mobile devices, providing phone interface access through http://m.gmail.com, named "Gmail Mobile".
Jan 2006	Gmail added a delete button to the menu bar.
Apr 2006	Gmail was integrated into the newly released Google Calendar service. World Wide Web Consortium (W3C) releases the first draft specification for the XMLHttpRequest object in an attempt to create an official web standard.
Dec 2006	Google open-sources the GWT toolkit. Starts a series of initiatives aimed at sponsoring AJAX.
Jan 2007	Google Docs & Spreadsheets is integrated with Gmail, providing the capability to open attached Microsoft Word DOC files directly from Gmail.
Feb 2007	Gmail registration is opened to the public. However, still remains in beta.
Jun 2008	Introduces Gmail Labs.
Jul 2009	Gmail moves out of its "beta" status.

Based on this iterative process of data collection and analysis, we wrote a case history chronicling: (a) the evolution of Google from its start in 1996 till 2010, (b) the genesis and development of Project Caribou, and (c) industry-level dynamics covering the events before and after the dot-com bubble burst in 2001. Our subsequent data analysis was shaped by emergent questions (Strauss & Corbin, 1998) such as – How did Google, a search engine company, develop so many products and services that were not directly related to search? How did Google's capabilities evolve over time? What were the origins of Project Caribou and how did it evolve? What were the popular tools, technologies and programming languages pre- and post- dotcom bubble? What did Google think of these tools, technologies and programming languages?

As we revisited the data with these questions, we used “focused coding” (Charmaz, 2006) to direct the themes that emerged from our earlier analysis into larger analytical categories. The two authors on this project did multiple rounds of iterations to re-view and re-write the case to illuminate the emergent codes, categories and concepts. We then used “theoretical coding” (Charmaz, 2006) to establish connections across themes and categories to strengthen and/or dismiss emerging findings and to tie them back to extant literature. The final output was the analytical case study that we present here. This case details the project incidents, organizational initiatives, and industry-level dynamics pertaining to Google avoiding potential traps.

As suggested by Lincoln and Guba (1985), qualitative researchers can take steps to establish “trustworthiness” of their research study in their own terms and merits. Credibility (a notion similar to “internal validity”) was established in our study through “triangulation” (Jick, 1979) across multiple data sources. Transferability (a concept similar to “external validity”) was strengthened by the use of “thick-descriptions” (Geertz, 1973). Finally, conformability was maintained through a close scrutiny of data, through numerous iterations between the data, the case, and the findings, and through maintaining a chain of evidence that would allow another individual to examine the logic of our analysis. We also conducted in-depth, semi-structured “confirmatory interviews” with eight Google employees at different ranks (two software engineers, one technical lead, one technical architect, two product managers, and two technical interns) to conduct “member-checks” (Van Maanen, 1988).

[Due to space constraints, we are skipping the descriptive details of the Google case. The case write-up could be obtained from the authors.]

FINDINGS AND DISCUSSION

Through Project Caribou, Google generated new products (*Gmail* and *AdSense*), a new business model (*contextual advertising*), and a new programming technique (*AJAX*), all of which have facilitated the re-surfacing of deeply held beliefs, assumptions and commitments. Through Gmail, it started offering a service that diverged from web search, and surfaced some of its shared beliefs and preconceived notions about a JavaScript while building expertise around AJAX that it championed. In doing so, Google gained a competitive advantage over other incumbent firms. Through AdSense, Google challenged another deeply held belief around monetization models of the time. These, in turn, generated capabilities for Google to build and monetize rich-internet applications. Together, these created a path for Google to becoming a platform of products and services.

Our inquiry into Google’s fifteen-year history offers an alternative – of what we labeled as the “design approach” – that has the potential to help companies avoid and navigate these cognitive traps. Specifically, we saw how agency rights were distributed across Google through projects that helped the firm in creating new options (instead of choosing from a pre-given set of alternatives) on an ongoing basis, leading to the co-activation of cognition and capabilities. Nascent concepts (such as ‘email as a conversation platform’, ‘asynchronous fetch’, and ‘context-sensitive ads’) got expanded, garnered new meaning, and found avenues for growth and transformation. Deeply-held managerial beliefs, assumptions and commitments that underlie cognitive traps too re-surfaced in the process. All of these, in turn, served as the basis for opportunity creation and ongoing organizational transformation.

MECHANISMS UNDERLYING THE DESIGN APPROACH

Based on the data that we gathered and presented, we theorize three interrelated mechanisms that helped Google reduce the possibility of falling into cognitive traps. While the specific mechanisms could vary from firm to firm, they however are driven by some commonalities that we would explicate later. First of these mechanisms is the temporal structuring rule that allows engineers to experiment with new ideas and options even as they go about their day-to-day work. Second are forums for mutual engagement where actors, artifacts and ideas connect. Third is

prototyping to establish proof of concept and to concretize promising ideas through the development and deployment of artifacts. We discuss these mechanisms in greater detail, illustrating them with examples from Project Caribou as well as from other instances at Google.

Temporal Structuring. In an article provocatively titled “The technology of foolishness”, March (1982) argued for the importance of injecting play into ongoing work. Play, by suspending the need to operate on the basis of taken-for-granted assumptions, allows actors to imagine new worlds. In the process, even the non-play world is transformed (see also Schrage, 2000).

At its most basic level, Google’s 20% rule can be construed as a mechanism to inject play into ongoing rehearsed performances. Specifically, engineers are empowered to pursue a course of action that they are passionate about. It is no wonder that more than 50 Google products, including Google News and the popular social networking site Orkut.com resulted from actors tapping onto this 20% time. Of course, an organization designed around play alone may not have the discipline to perform on an ongoing basis. That is, while transformation through play is important, it is equally important to perform as well. Otherwise, there will be fewer resources to engage in experimentation. In this regard, 80% of the time is for ongoing activities that have to do with established businesses.

Although the 20% principle is in itself valuable, its pure mechanical application may yield only sub-optimal results. That is, this 20% time is not just about the availability of ‘slack’ time for engineers. Only few employees use 20% of time every day or each week mechanically to “tinker on a pet project” (Hamel & Breen, 2007). Rather, this 20% time is meant to let engineers do what they “think is the best thing to do” (Page, 2004) for themselves and for the organization. From this perspective, the 20% rule is an institutionalized mechanism that allows for the exploration of ideas that emerge in and through routine work, whenever it happens. It is when people are engaged with problems, with their colleagues, operating in emergent contexts, working with new materials, that their creative capacities are heightened. Such occasions – moments of kairos* – often cannot be willed, but, instead, are a part and parcel of ongoing work driven by chronos, or clock time (Czarniawska, 2004; Garud, Gehman, & Kumaraswamy, 2011).

The melding of karios and chronos (Garud, Gehman, & Kumaraswamy, 2011; Orlikowski & Yates, 2002) offers several additional advantages. For instance, such temporal structuring ends up allocating important agency rights to those who are at the ‘scene of the action’. To the extent that such a mechanism is part of an organization’s culture, actors have the leeway to deviate from existing organizational norms (Garud & Karnoe, 2001). An institutionalization of the possibility to deviate is important as there is likely to be interpretive asymmetry between ‘tacit knowing’ and ‘decontextualized knowledge’ that is created when organizations embrace an approach to governance that is similar to that of the Design School. Moreover, thinking is not separated from action, but occurs through action (cf. Schon, 1984).As Weick (1995) pointed out, “How can I know what I think until I see what I say?” In short, the 20% time allows actors to engage in such cognizing through action.

The distribution of agency rights serves another purpose – it enriches tasks. For instance, being creative and reflective on the job can be intrinsically rewarding in and of itself. This can lead to the generation of new ideas as it empowers reflection-through-action during work. In other words, the distribution of agency rights is generative not only because it taps into the creative inputs of a distributed set of employees but also because it encourages creativity and reflection at the moment of work.

Mutual Engagement. It is all very well to have these private moments of serendipity during work that generates ideas and insights that can be pursued with the 20% time. But, it is another to amplify these ideas in the context of an organization. And, it is here that ‘demo slams’ play a role.

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*“Kairos”, in Greek mythology, refers to the God of opportune moments.

As we described with Project Caribou, demo slams are occasions when employees have an opportunity to demonstrate and showcase these ideas and prototypes to others. At demo slams, employees can crystallize and pitch their kairos driven moments of insights in ways comprehensible to others. In turn, others at these demo slams may then translate, amplify and connect with the ideas that have been pitched. Moreover, the public demonstration of an initiative that was once private serves to build and signal commitment.

All of this is done in a setting where it is expected that the idea being demonstrated will not be complete. By demonstrating something that is in-the-making, actors trigger attention not only to 'what is' but also to 'what can be' (Goodman, 1978; Simon, 1996). In turn, when participants encounter ideas that do not fit organizational norms, they are likely to become more reflexive about their own practices, which in-turn may be modified.

Another way to think about demo slams is that they represent a space for the cross-pollination of ideas. Literature has talked a lot about how novelty emerges from a recombination of existing ideas (cf. Hargadon & Sutton, 1997; Garud, Gehman and Kumaraswamy, 2011). This is very much the case with demo slams as well. One way that recombination occurs is by allowing employees to pool their 20% time in order to pursue collaborative projects. For instance, we saw how the 'AJAX grouplet' served as a key mechanism for the diffusion of the technique of using JavaScript and XHR for building web applications. It is through the diffusion of this technique that Google was able to develop an organizational capability to build rich-internet applications.

The temporal structuring of these spaces overcomes an apparent paradox between the need for urgency to sponsor ongoing initiatives at the organizational level and the need for adequate time to scope out an idea at the individual level. Specifically the structuring of demo slams on a weekly basis creates an options space for individuals to exercise. Urgency emerges because of ongoing presentations of ideas by different employees. Temporal flexibility is established by giving actors the opportunity to present only when they are ready.

In short, mutual engagement spaces are institutionalized forums for bringing actors, artifacts and ideas together. In the process, new opportunities emerge in real time that can then be realized over time. The dynamics that unfold in these forums twists the Weickian phrase "How can I know what I think until I see what I say?" to "How can I know what I think until I see what others have to say and show?"

Prototyping. Besides the structuring of time to generate creative ideas during work and the availability of forums to amplify these ideas by demonstrating them to others, prototyping is yet another of Google's practices underlying the emergence of Gmail, AdSense and AJAX. Prototypes, by one definition, are early semi-concretized representations of what was just an idea (Ewenstein & Whyte, 2009). Somewhere between ephemeral thought and stabilized practice, prototypes are key mechanisms whereby actors "think with their hands" (Sennett, 2008). Often, prototypes are based on a transformation of what may be readily available to create a quick and dirty working model to establish proof of concept. In this sense, prototypes are outcomes of bricolage (Baker & Nelson, 2005; Garud & Karnoe, 2003).

Schrage (2000) noted that an organization's prototyping culture says a lot about its innovation capabilities. In the case of Google, by allowing for the prototyping of quick and dirty models, the company signaled to its employees that incomplete designs that are not perfect ought not be considered as mistakes, but outcomes of experimental probes. And, as these experiments unfold, as with Gmail and AdSense, they serve to surface deeply held beliefs such as those around JavaScript and context-sensitive ads. Prototyping, in this sense, modify the Weick's observations on knowing to the following "How can we know what we think until we see, what we have built?"

Going beyond the demonstration of proof of concept, these prototypes represent a basis for enactment between multiple actors with different frames of reference (Dougherty, 1992). Prototypes serve as "boundary objects" (Star & Griesemer, 1989), simultaneously coherent and plastic to allow for different social groups to engage in collective reflection-through-action (cf.

Levina, 2005). It is through such interactions that user preferences, organizational capabilities and overall meaning emerge. In this sense, prototypes are not just models of what may be in the minds of some actors. Instead, they become models for the development of new possibilities that emerge in and through actions and interactions.

Amongst the most important set of interactions that unfold is between those who develop a prototype and potential users. In developing a prototype, producers are driven by their intuitions and are enabled and constrained by the resources available to them. On the other side, functionality is often discovered in use. For instance, at Google, Mayer's preferences emerged in use as she experienced content-targeted ads, a notion she had originally opposed. But, once she began using the prototype that Buchheit had created, she immediately understood its benefits and became its advocate.

Appreciating the benefits of connecting production with use, Google has created Gmail Labs where it lists its experimental features to the public. By trying out new features, users signal to the company the ones that they consider the most useful. These features are then integrated into the design of the core product. It is through such co-creation processes that users' preferences emerge even as capabilities are formed.

The overall process has been labeled as iterative prototyping. One perspective advocates the benefits of 'failing fast' in order to appreciate the emerging possibility through such processes (Thomke, 2003). The enactment perspective (Garud & Karnoe, 2001; Orlikowski, 2004; Suchman, 2004) to which we subscribe provides a slightly different orientation. It is not 'fail fast' but rather 'experiment fast'. That is, prototyping is a process for actors to probe and create a world that is both possible and desirable (Boland and Collopy, 2004) with each prototype but an intermediary step that adds to an emerging platform of options (Ciborra, 1996). In other words, prototypes could be considered as working models – something that is not be to merely copied, but instead to "afford a demonstration of the feasibility of the principle, and of the methods which make it feasible" (Dewey, 1900). As we saw from the case, the initial version of the Gmail prototype was built within a day by experimenting on the already established Google Groups code base. Similarly, a 1GB free storage space for Gmail emerged as a reality because of Google's capabilities to prototype and experiment rapidly around its existing platform.

Interaction across the three mechanisms. Each mechanism is important in helping an organization avoid traps. But, the value of each is amplified when we consider them in combination. The 20% rule distributes agency rights across the organization and locates it at the scene of action. Opportunities for mutual engagement then corrals these distributed efforts together. Prototyping grounds these nascent ideas into practice and, in the process, implicates additional social groups.

Such interaction between mechanisms was a recurrent pattern across the various outcomes that Project Caribou generated for Google. For instance, the first Gmail prototype was developed by leveraging the 20% time option to experiment rapidly with the existing Google Groups codebase. When circulated through the internal corporate LAN and showcased at demo slams, the prototype made the case for building an email application and for using JavaScript. Similarly, the AdSense prototype was developed by combining existent code bases and by leveraging the 20% time. Not only did Google realize the potential of context-sensitive ads when this prototype was put in use, but also that these ads could be displayed within various other web pages and applications. Lastly, individual 20% time, when clubbed together into collaborative grouplets, enabled the diffusion of AJAX programming technique both within and outside the organization. As a result, Google built up capabilities for a future (i.e. Web 2.0) that it had partly helped create. All of these, in turn, enabled Google to reconsider its deeply held beliefs, commitments and assumptions that underlie cognitive traps.

In sum, these interacting mechanisms allowed for the emergence of new ideas at work that were shared and amplified with others in public spaces and enacted through prototyping processes. At

Google, these mechanisms led to the realization of a few opportunities that were worth pursuing, and when implemented, resulted in the transformation of the organization. As Google's website highlighted, "A lot has changed since the first Google search engine appeared. We have grown and expanded our offerings from a single service to dozens… From offering search in a single language we now offer dozens of products and services – including various forms of advertising and web applications for all kinds of tasks – in scores of languages" (Google, 2010).

A DESIGN APPROACH TO NAVIGATING COGNITIVE TRAPS

At its core, the mechanisms that we discussed so far draw upon the generative inputs of employees who are empowered by Google's 20% rule to explore ideas that may emerge through work but may deviate from established norms and beliefs. Opportunities for mutual engagement allow for the articulation, amplification and recombination of these ideas. Furthermore, prototyping allows for the grounding of these ideas into practice.

Juxtaposing these mechanisms against the Design School approach highlights several important differences. First, instead of agency rights being concentrated in the hands of a few, it is distributed across employees. It was not top management alone that could decide what to pursue, but equally importantly Google employees who were empowered to use their 20% time to explore even as they pursued their day-to-day activities (Garud, Gehman & Kumaraswamy, 2011; Jelinek, 1997). Agency at Google, thus, is not a "thing" that people possess, but instead, is relational and an emergent property of that ecology of actions and interactions distributed all across the organization (Tsoukas, 1996). Such distribution of agency facilitates recombination of ideas – for instance at demo slams and in grouplets. Prototyping processes further distributed agency not only across people but also across artifacts that, as they emerged, progressively enabled and constrained the progression of Project Caribou. Distributing agency rights, thus, paradoxically brought actors, artifacts and ideas together and facilitated the continual generation of options in real time that was reaped and realized over time.

Second, alternatives were not considered as a "given" that could be scanned, searched, interpreted, evaluated, and chosen from the environment. Instead, they were actively created within a context (e.g. market for rich-internet applications) that itself was emergent and partly shaped by Google's actions (Garud & Karnoe, 2001; Pandza & Thorpe, 2010). As was evident with Gmail, AdSense and AJAX, choices become trivial and almost self-evident once powerful alternatives were available. The assumption behind this goes as follows: it is far more difficult to come up with powerful alternatives than it is to make a choice (Boland & Collopy, 2004; Hatchuel, 2002). Once powerful alternatives have emerged, choice becomes trivial and almost self-evident. That is, choice point becomes the culmination of a journey rather than its initiation. The challenge, therefore, is not the one of choosing between alternatives, but instead, in creating those alternatives and actively engaging with them, and in structuring a situation in such a way that choice becomes trivial.

Third, rather than cognition dictating firm capabilities, they both were productively intertwined, resulting in the continual generation of options on an ongoing basis. This intertwining of cognition and capabilities is orchestrated via 'reflection in and through action' rather than 'search'. The term 'search' (Dosi, Nelson & Winter, 2000; Gavetti & Levinthal, 2000; Nelson & Winter, 1982) that is typically evoked by those who espouse the Design School suggests that there is a pre-existing world out there from which actors choose. It connotes an "isolated cognition of the world" wherein thinking is separated from action. Reflection in and through action, on the other hand, suggests that thinking is not separated from action, but instead, occurs in it and through it (cf. Schon, 1984). Actors, thus, transform local possibilities into new opportunities (Goodman, 1978; Sarasvathy, 2001) with things-at-hand (Levi-Strauss, 1966; Baker & Nelson, 2005; Garud & Karnoe, 2003;) rather than scanning, listing, evaluating and choosing from a pre-given set of alternatives.

These three processes are core to what we call the new "design approach" (e.g. Liedtka, 2000) to strategy-making. With such an approach, firm capabilities are not completely dependent upon

the cognitive capacities of a few decision makers at the top (Boland & Collopy, 2004; Jelinek et al., 2008). Instead, they emerge through an ecology of interactions that expands the capacity of a distributed set of actors to come up with new forms, ideas and concepts (Hatchuel, 2001; Romme, 2003). For instance, the origins of Project Caribou cannot be attributed to Google's top management who, prior to Project Caribou, did not have any preferences about Gmail. Instead the project emerged because of the gut instincts of employees who, through their actions, built new capabilities at Google. And, the market for rich-internet applications was not 'out there' waiting to be searched (Geroski, 2003) but instead emerged partly because of Google's actions. As a result, the organization was not framed by its prior beliefs, commitments and assumptions, but instead, was able to navigate the cognitive traps that were set in motion.

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NEW PRODUCT DEVELOPMENT IN DESIGN-LED ORGANIZATIONS. INSIGHTS FROM THE SWEDISH FURNITURE MANUFACTURING INDUSTRY

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The overall aim of this research is to provide new knowledge on how a design-centric logic affects the new product development process. The study focuses on the early stages of new product development, i.e. the new product strategy formulation, idea generation, idea screening, and concept development and testing (Borja De Mozota, 2004, p.120). These early stages are proven critical for successful product development and are depending on a successful interplay between design and other functional areas involved in product development. The findings from a qualitative study of five new product development projects in two design-led organizations are presented.

Keywords: design-led, new product development, organizational logic

INTRODUCTION

In most organizations, new product development, i.e. the process of transforming market opportunities into a product available for sale (Krishnan & Ulrich, 2001), is critical to create and sustain competitive advantage. More and more, product design is recognized as a means for differentiation and in building brand value and, thus, it becomes increasingly critical for companies to understand the complexity to design. This matter has been raised as a key issue for further research in several recent studies (Veryzer, 2005; Beverland, 2005; Bruce and Daly, 2007; Luchs and Swan, 2011) as, despite its known importance to industry, a comparatively low level of attention is given to product design and its relation to marketing (Luchs and Swan, 2011).

Literature suggests that organizations, even when recognizing the importance of design, may have difficulties in the actual integration of design. Previous research presents a number of barriers as possible reason for such difficulties e.g. short-termism, i.e lack of strategy; low risk management, i.e. an unwillingness to take business risks; cost constraints and design illiteracy, i.e. management with little or no knowledge of design (see e.g., M Bruce & Bessant, 2002; Lorenz, 1994). It is also suggested in literature that the industrial design function is often involved to late in the NPD process and, thus, gets too little influence (Borja De Mozota, 2004; Perks, Cooper, & Jones, 2005).

However, literature also acknowledges the existence of organizations where design is an integral part of the business success and considered a key strategic element. These so called “design-led” firms are “characterized by a dominant logic that views design as central to the companies’ strategic positioning” (Beverland and Farrell, 2007), i.e. a design-centric logic. Moreover, their brand and design processes are closely related and their product design is, according to Beverland and Farrell (2007:15), “a physical manifestation of their brand”.

Still, little empirical research exists on such organizations and what enables them to implement a design-centric logic in difference to other organizations experiencing difficulties in overcoming several different barriers in integration of design. Thus, the overall aim of this article is to provide new knowledge on how a design-centric logic affects the new product development process and how it is manifested in practice. The focus in this research will be the early stages of new product development, i.e. the new product strategy formulation, idea generation, idea screening and concept development and testing (Borja De Mozota, 2004, p.120). These early stages are proven critical for successful product development and are depending on a successful interplay between design and other functional areas involved in product development. The research question may be

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formulated as “How and why does a design-centric logic affect the early stages in organizations’ new product development processes?”.

This research contributes to product development and marketing literature by providing new insights on the practices during new product development processes in a seldom researched context, i.e. design-led organizations. It will also contribute to marketing literature by providing an understanding of how design-led companies create competitive advantage by the integration of design.

METHODOLOGY

The purpose of the study is to explore how a design-centric logic affects the new product development process. Different from many previous studies on how design is related to new product development, this study examines development at the project level, instead of the overall company level. By this research approach, it is possible to study also such differences between projects that are due to e.g. product variation and actors involved. Moreover, by focusing on collecting and analyzing data presenting the activities within the project, it is possible to study the interaction and thus characterize how decisions and actions involving design affect the new product development process in design-led companies.

RESEARCH DESIGN AND SAMPLING

This paper is based on case research, which is a strong method for both theory testing and theory building (Voss, Tsikriktsis, & Frohlich, 2002). This is a suitable method in this research as the overall aim is to expand existing theory, by exploring how and why a design-centric logic affects the new product development process.

A multiple-case study was conducted, involving five different new product development projects in the context of the research interest. Multiple cases may reduce the depth of study when resources are constrained, but can also augment the external validity (Voss, et al., 2002). In this study, only a few cases were selected, and these were studied by depth. The cases were chosen for theoretical rather than statistical reasons (Eisenhardt, 1989), i.e. the goal was to include only such cases that could provide useful insights on our research question. Design-led industries were identified out from observations in an earlier study by Brege (Brege, Milewski, & Berglund, 2001), and the selection was verified by discussions with practitioners. To control environmental variation, the study was limited to one single industrial context, i.e. Swedish designer furniture manufacturers. The new product development projects were selected by the CEO:s at the selected companies, based on the criteria that the projects should have been recently finalized, and also if possible, differed, e.g. because of different types of products being developed or cooperation with different designers. Still, all cases are examples of designer products with a high degree of innovativeness.

COMPANIES AND CASES

As described above, a selection of five new product development projects from two different design-led companies was made. These two companies are both well established Swedish furniture manufacturers of designer furniture. Both companies have had Swedish and European media attention because of their designer products during the last decade and their company brand is strongly connected to product design. Their sales export is important and they are both represented on international design fairs, e.g. the Milano fair for design furniture.

In all cases, the designers are external design resources that are contracted on a shorter or longer basis.

COMPANY A

Company A is a subsidiary of a Swedish group of manufacturers of different products, all strongly connected to product design. The group is listed on the Nasdaq OMX Stockholm. The company

has 135 employees and a turnover of 30 MEUR (2011). Company A does not have in-house designers but cooperates with a small number of designers on a regular and long-term basis.

Sofa was presented by Company A at the Stockholm Furniture Fair 2012. The designer had cooperated with Company A on many previous projects during a long period of time. The designer is well established and well-known on the Swedish furniture market. Her personal brand is strongly connected to Company A.

Easy Chair was presented by Company A at the Stockholm Furniture Fair 2011. The designer of Easy Chair, had never cooperated with the company before. The designer is a well established designer of furniture and other products, however not previously on the Swedish market.

COMPANY B

Company B is a family owned and family managed company with long tradition in furniture manufacturing. The company has 36 employees and a turnover of 3.5 MEUR (2011). Company B does not have in-house designers but cooperates with a large number of designers on short or long terms.

Table was presented by Company B at the Stockholm Furniture Fair 2012. The designer had been cooperating with Company B earlier as the designer of another table solution. The designer is well established and cooperates with a number of Swedish furniture manufacturers.

Ottoman was presented by Company B at the Stockholm Furniture Fair 2012. The designer team of Ottoman, had never cooperated with the company before. The designer team is well established, however still unknown on the Swedish market. In this study, only one of the two designer is interviewed and referred to, as he was the one most actively involved in designing Ottoman.

Book Shelf was presented by Company B at the Stockholm Furniture Fair 2012. The designer had never cooperated with the company before but is well established and known on the Swedish market.

DATA COLLECTION

Data was collected through thirteen in-depth interviews with respondents holding different positions within Company A and Company B (e.g. CEO, product development manager) and the designers, which were in all five cases self-employed. The study thus relies on insights from both the manufacturing companies' and the external designers' perspective. As the aim was to understand the new product development process, the persons that had been most actively involved during this process and, thus, were well informed on the subject in focus were interviewed. As the inquiry was for theory building and the aim was to discover and understand each case individually and in depth, the approach was narrative. Thus, the respondents were encouraged to tell their "story" of the NPD project in their own words and the empirical material consists of narratives of the respondents' experiences from working with the product development of the different cases. The interviews, that lasted between one and two hours, were recorded and then transcribed in detail.

DATA ANALYSIS

The transcribed interviews were coded manually using the software Nvivo 8, a computer-based text analysis program. By using a cross-case searching method for data, we aimed at going beyond our initial impressions (Eisenhardt, 1989). A traditional approach to analysis of qualitative data was used (Miles & Huberman, 1994). The early stages of the new product development process, i.e. new product strategy, idea generation, idea screening and concept development and testing (Borja De Mozota, 2004, p.120), was selected as the main tree nodes for coding. From the empirical data, several different activities during the new product development process were identified. These activities where used as lower tree nodes when further coding data, allowing identification and analysis of activities within the different cases. A cross-case analysis was made, looking for similarities and differences between the cases. From the relationships we found

between the different dimensions, we were able to form constructs. In order to increase the validity of these constructs, they were once again compared to existing data (Eisenhardt, 1989).

FINDINGS

The findings, described below, are categorized into the four early stages of new product development, as described by Borja De Mozota (2004, p. 120). However, even if new product development processes often are described as linear and well-structured they may in reality often be both flexible, fluid and include fuzzy gates (Cooper, 1994). This was also apparent in these cases.

NEW PRODUCT STRATEGY

Table 1 New product strategy

		Company A		Company B	
	Case Sofa	Case Easy Chair	Case Table	Case Ottoman	Case Book Shelf
New product strategy	Intention to develop from existing technical solution	Intention to retake brand position	Emergent/ non-existent product strategy	Emergent/ non-existent product strategy	Emergent/ non existent product strategy

All cases besides Sofa are examples of rather emergent new product strategies, i.e. decisions on what new products to develop are not strongly connected to an intended – at least not expressed - product strategy.

In case Easy Chair, Company A describes an intention to retake a brand position as a “design leader”. This intention was not only on the product level but also on the designer level, i.e. the product was also a result of the company’s intention to contract a new designer as a part of their renewal of the brand position. The CEO at Company A describes:

> *’Well, we needed to change our product development to show that we are able to develop products that are innovative and…we thought that we needed to retake a position as product leaders that we believed that we had lost.’* (CEO, Company A)

However, the CEO describes that in other cases a ’product-market’ analysis is performed as part of the new product development process. However, he says that in this, particular case, ’…we followed our gut feeling and said to our self that “This is what we will go for”’. The findings from case Sofa, from Company A, supports the fact that there is normally more of a product-market analysis done in Company A and that this was done in case Sofa. Sofa was also a result of an intention to further develop an existing technical solution, developed by the designer and Company A in cooperation. The designer and the manufacturer wanted to further develop an existing line of furniture with modular sofas, based on a proprietary technical method for fittings, i.e. a unique skill.

It is also indicated in the interviews with Companies A and B, that, different strategic intentions with the products lead to differences in the new product development process. The CEO at Company A mentions that some products, e.g. Easy Chair, are regarded as ”profile” products and, thus, intended to communicate the corporate brand, whereas others are intended to be volume products. In this latter case, the focus on cost issues and pricing is higher. The CEO at Company B mentions that some products are ’unique’ and, thus, less evaluated out from cost: ‘But products that are unique, there are nothing like them. They are allowed to cost and will still sell’.

In Company B, all three cases were a result of the CEO searching for and discovering interesting products, e.g. at a fair or being presented by a designer on a meeting. The CEO describes that he has categorized the different products in Company B’s existing product range to be able to find and fill gaps. However, he also describes that he is lead by opportunities: ‘Well then

(at the furniture fair), I did not have that plan in mind *laughs*. This is where you are so ambivalent sometimes. “Oh, that looks really good”, and you fall for that.’ In other words, the existing product strategy is not rigid. When an opportunity rises, the CEO grabs it.

Idea generation

Table 2 Idea generation

		Company A		Company B	
	Case Sofa	Case Easy Chair	Case Table	Case Ottoman	Case Book Shelf
Idea gener-ation	Getting idea to develop new product. out from unique technical solution (designer, prod.dvpt mgr) Evaluating competing products (designer) Suggest-ing product. (designer)	Analyzing existing portfolio of designers (CEO, prod.dvpt mgr.) Selecting and contacting a designer (CEO, prod.dvpt mgr) First prototype developed by designer before cooperat-ion (designer) Evaluating if Easy Chair fits Company (designer) Suggest-ing product. (designer)	Getting inspiration from external environ-ment (CEO) Evaluating existing product range (CEO) Evaluating possible designers (CEO) Preparing and sending out brief (CEO) Suggestin g product (designer)	Generat-ing product idea (drawings) before cooperat-ion (designer) Evaluating possible manufact-urers for Ottoman (designer) Suggest-ing product (designer)	Develop-ing first full-scale prototype (designer) Present-ing product at fair (designer) Discover-ing product at fair (CEO) Evaluating possible manufact-urers (designer)

The Idea generation stages were, as a consequence of the above described little formalized strategy, rather led by emerging “opportunities” in all cases besides Sofa.

The designer has a very large impact on idea generation in all cases except from in case Table, where the idea originally came from the CEO. In case Easy Chair, Ottoman and Book Shelf, the idea generation was performed by the external designer without a particular manufacturer in mind. However, in cases Easy Chair and Ottoman the designers mention that they did an evaluation of potential manufacturers’ existing product portfolio before suggesting the product idea, whereas, in case Book Shelf it was the CEO at Company B that discovered and selected the product idea at a fair. Case Table was the only case were the product idea is initiated by the manufacturer, in this case Company B. The actual product idea generation was not, in any of the cases, described as based on explicit market or customer needs. In case Sofa, it is the designer, since long familiar with Company A, who evaluates potentially competing products on the market, in order to avoid designing a product that is to similar.

Thus, as the designer often has an important role during the idea generation stage, the evaluation of possible designers and selection of a particular designer seems to be one crucial activity during this stage. In case Sofa, the designer has developed a unique technical solution in cooperation with the company and, thus, was the natural choice for designing Sofa. The product idea was generated by the designer in this case. In case Easy Chair, it was rather the idea of initiating cooperation with a new designer than the idea of a new product that was generated at first. The CEO at Company A describes their choice as based on former reputation and skills: 'He is no inexperienced designer by any means, he has designed for several companies and has a good reputation, a very very skilled person'. Moreover, the new product development manager adds that the cooperative skills were important for their choice: 'Well, it is like you will live in a family, you have to accept and be together...in the culture... If the person is very arrogant sort of, that will never work out'. It is mentioned several times in the interviews for case Easy Chair and Sofa, both by the designers and Company A, that the intention is a long-term business relationship and the word "family" is repeated several times. Also in case Table, the successful relationship was mentioned by the CEO at Company B as the reason to only select a few familiar designers as receivers of the brief. The designer in case Table says 'the relationship is more important that some want to admit and continue by giving the reasons for a selection of a designer: '...because you are skilled, because you are well-known and gets publicity, because of an idea that they cannot resist or because you are pals'. The importance of the designers' reputation and former experiences is also mentioned in case Ottoman and case Bookshelf.

However, there is also a selection of potential business partners made by the designer, mentioned in cases Ottoman and Book Shelf. In case Ottoman, the designer describes the choice of potential manufacturer as based on enough financial strength but primarily based on his view on the product design of Company B's products and their reputation. Also in case Book Shelf it is mentioned that the designer actually searched for and evaluated different possibilities before selecting Company B.

IDEA SCREENING

Table3 Idea screening practices

		Company A		Company B	
	Case Sofa	Case Easy Chair	Case Table	Case Ottoman	Case Book Shelf
Idea screening	Evaluating existing products including their design strategy (CEO, marketing mgr, prod.dvpt mgr)	Evaluating existing portfolio of designers and "their" products (CEO, marketing mgr, prod.dvpt. mgr) Evaluating existing products including design strategy (CEO, marketing mgr, prod.dvpt mgr)	Evaluating possible development of existing products (Designer) Evaluating product suggestions from designers (CEO) Selecting and initiating cooperat-ion with designer (CEO)	Evaluating designer and product suggest-ion (CEO)	Evaluating product at fair (CEO) Evaluating designer (CEO)

The idea screening is normally performed by Company A and B internally, without involvement of the external designers. However, as earlier mentioned, there are indications of a sort of screening of the product ideas, i.e. an evaluation of the potential fit, performed by the designers already before suggesting a product idea to the manufacturer. In case Sofa, Company A describes a formal decision meeting, involving the designer, the CEO, the product development manager and the marketing manager at that time. The decision was based on e.g. fit with the existing product range and design strategy. However, in case Easy Chair, as mentioned before, the process was somewhat different. Here, the decision was also made out of the intention to renew the brand position by cooperating with a new designer. The CEO at Company A describes that: 'Well, finding a skilled designer, that is critical to us, it is essential for our business success. And that is why...it is important that we show that we want to meet the designer's wishes and share a risk with him and develop a product from an idea he generated'.

In case Easy chair, the idea screening and selection of product to develop further was also affected by Company A's intention not to disturb the relation with the other designers in the portfolio, i.e. by avoiding to introduce products that risk to compete with other designer's products. By introducing a solitaire Easy Chair in this case, the designer could be introduced without potential conflicts. In other words, in this case the designer was more important than the composition of the product portfolio. The product development manager describes:

> *I was hesitating a little on the decision to develop that product (Easy Chair), because it is...it is just as much directed towards the "Home" segment as to the "Office" segment and we are almost 100% "Office. But, than there is always this game between the designers, it is like a family, "well, why does he do that and not I", so I decided to...well, let us bring "Easy Chair" in, as it will not disturb any other designer. So he can be brought into the family so to say. And feel comfortable. It is *laugh* a lot like that too.'* (Product development manager, Company A).

In case Table Company B's CEO screened the different product suggestions he received from the designers responding to the brief. However, in all other cases, the idea screening is rather

integrated with the idea generation stage and becomes more of a discussion on improvements and changes on the (often single) initial product idea than a formal evaluation of different possible ideas and selection of one idea to further develop.

In Company A, the idea screening stage was generally described as more formal with an approval in a product decision committee (CEO, marketing manager, product development manager). In the Sofa case, the designer is very integrated with the company after many years of cooperation and, thus, has a great influence also on the idea screening.

CONCEPT DEVELOPMENT AND TESTING

Table 4 Concept development and testing practices

		Company A		Company B	
	Case Sofa	Case Easy Chair	Case Table	Case Ottoman	Case Book Shelf
Concept development and testing	Development in close and interative cooperat-ion (designer, prod.dvpt mgr) Prototype making (prod.dvpt mgr)	Further development in close and interative cooperat-ion (designer, prod.dvpt mgr) Prototype making (prod.dvpt mgr)	Development in close and interative cooperat-ion (designer, prod.dvpt mgr) Prototype making and evaluation (prod.dvpt mgr, designer)	Development in close and interative cooperat-ion (designer, prod.dvpt mgr) Prototype making and evaluation (prod.dvpt mgr, designer)	Further development in close and interative cooperat-ion (designer, prod.dvpt mgr) Prototype making and evaluation (prod.dvpt mgr, designer)

The cases present several similarities during the concept development stage. First, in all cases, the development of the concept is performed in close cooperation between the designers and the other actors involved. Moreover, the process is iterative, i.e. more than one prototype are produced and evaluated in order to visually evaluate the potential concepts. It is mentioned that prototypes are necessary also in this early stage, since the visual appearance of designer furniture is critical and difficult to judge from drawings. The evaluation of the prototypes, of factors as visual appearance, production issues, and cost issues, is done in close cooperation between the designer and other actors involved in product development. A number of conflicts of interest during this stage were described, however always resolved by discussion and described as a normal and appreciated part of the creative process, both by the designers and the other actors. For example, in case Ottoman, the designer describes that the CEO, with his “good eye for design” is a valuable “filter” that helps him in sorting out the best concept from a number of different possibilities and helps you to “question yourself”. The designer emphasizes the importance of such cooperation to be able to develop a good final concept. However, the designers also lift the potential risk if compromising too much during the process and the importance of believing and maintain your original idea. The designer of Table describes: ‘There are compromises. It is important not to agree on everything, because the product may “die”, which I have experienced several times.”

DISCUSSION AND CONCLUSIONS

The overall aim with this research was to provide new knowledge on how a design-centric logic may affect the new product development process. The selected cases are examples of organizations where, in line with Beverland’s (2005) definition of design-led companies, design is

considered important for the company's strategic positioning and product design is "a manifestation of the brand". In other words, management's "design illiteracy", mentioned by Bruce and Bessant (2002) as a potential barrier to integrating design in product development is not present in these cases. Instead, the study indicates an appreciation and awareness of the importance of design. More-over, there is an understanding of design's long-term effects (cf. M Bruce & Bessant, 2002) that motivates the organization's investments in design.

In this study neither Company A nor Company B have in-house designers, but instead contract external design resources. Previous studies have concluded that organizations frequently choose to out-source knowledge intensive activities as a way to acquire capabilities that firms do not possess themselves (Hsuan & Mahnke, 2011; Utterback, et al., 2006) and that external designers, as being less familiar with the organization's product history and strategy, may be more innovative (M Bruce & Morris, 1998). it has been suggested that innovative organizations cooperate with a larger number of external designers than others (Dell'era & Verganti, 2009). In this research, the selection of a particular designer, with his own reputation, personal brand and design skills, is described as a highly critical issue, as the resulting product design is often closely integrated with the corporate brand. This issue is still little emphasized in new product development research.

Moreover, the personal relationship seems to be a critical factor in all the early phases of new product development, and mutual trust and cooperative competency (Sivadas & Dwyer, 2000) are indicated as important for a fruitful and innovative cooperation. This notion is in line with previous research on innovative capacity in inter-organizational relationships, where trust and reciprocity are presented as important characteristics (see e.g., Uzzi, 1997).

NEW PRODUCT DEVELOPMENT PROCESS

The results indicate a number of relations between the studied organizations' design-centric logic and the early stages of new product development (fig 1). The relations will be further described below.

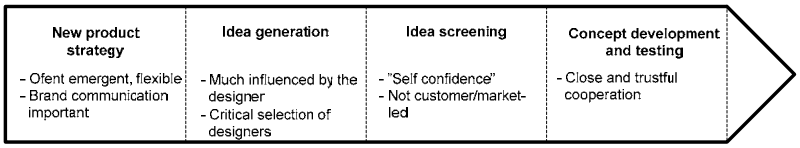

Figure 1: New product development in organizations with a design-centric logic

NEW PRODUCT STRATEGY

The empirical study indicates that activities during the stages of idea generation and idea screening in design-led organizations may often not rely on a rigid product strategy, but is allowed to be flexible, also allowing emergent possibilities, e.g. in terms of a new designer or a new product, to generate fruitful ideas. The importance of "grasping the moment" is stressed in the interview and has been emphasized in previous literature for successful development of products with a high degree of newness.

Moreover, the study indicates that market evaluations, e.g. of customer or market demands or analysis of competing products, is not critical during the early stages. This notion is somewhat in contrast to product development and marketing literature which often presents research on user-centered design where design answers directly to the demand of the market (Verganti, 2008). In agreement, a number of marketing researchers have suggested how new design can be aligned with the overall business strategy of a company (see e.g., Margaret Bruce & Daly, 2007; Kotler & Rath, 1984; Olson, Cooper, & Slater, 1998). Instead, this research supports Verganti's (2008) previous research on design-led innovations, where he concludes that such innovations do not start from user's insights as they are only able to foresee innovations that are line with what is happening today.

Also, supporting Beverland's research on design-led organizations, the intended brand communication seems to be an underlying factor in the new product development strategy.

Whereas some products are intended to be ”profile products”, i.e. developed primarily to clearly communicate the corporate brand by their product design, other products are intended to be commercially driven volume products. The differences in strategic intention seems to lead to differences during the new product development process, e.g. as the emphasis on cost issues is lower on “profile products”.

IDEA GENERATION

During this stage, the manufacturer’s selection of the external design resource seems to be a critical issue, however little emphasized in previous research on innovation and new product development. This notion may be related to the selection of industrial context, i.e. the designer furniture industry, where the product design is often strongly related to an individual, in this case the designer.

Moreover, also little emphasized in literature, the manufacturers’ ability to attract designers is stressed in the interviews. In the designers’ selection of a potential manufacturer, they indicate that company background and history is taken into account besides the ever present economical situation

IDEA SCREENING

During this stage, Companies A and B show a confidence in their own ability in judging “good design”, i.e. they rely on their ability to select successful products without referring to e.g. market or customer needs or opinions from peers. As already mention, Verganti (2008) suggests that organizations with a design-led approach to innovation o not believe that users/customers are able to foresee innovative products.

Moreover, not discussed in previous literature, it is indicated that the organizations’ intentions to build and maintain good long-term relations with the contracted designers, affect their selection of new products, e.g. by not risking “cannibalization” on another designer’s former products.

CONCEPT DEVELOPMENT AND TESTING

As already mentioned, the designers were in all the selected cases externally contracted design resources. Bruce and Morris (1994) conclude that a company’s relation with external designers may be of different duration and degree of closeness. In this study there are in all cases a close relation between the designers and other actors involved in product development. Moreover, mutual respect and trust between the actors is apparent in all cases seems to be critical for innovative new product development. The conflicts in interests, e.g. on the most suitable visual appearance, sometimes in relation to cost issues, are easily resolved. In fact, such conflicts are lifted as necessary and positive, leading to better products. Also, the manufacturer’s willingness to experiment and ability to take decisions are lifted as core issues.

LIMITATIONS AND FURTHER RESEARCH

As always, this research shows some limitations and indicates a number of issues that deserve further research. The above suggested relationships will be further explored within our research project.

One notion is that size and ownership structure of the selected companies may have an impact on the findings, e.g. the absence of a formalized new product development strategy. Further research is necessary to understand to what extent these results are transferable to larger organizations.

The selection of industrial context may also have impact on the findings. This research only presents cases from the designer furniture manufacturing industry and it would, thus, be interesting to replicate the study in other industries to verify its external validity.

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WORK-WELL: CREATING A CULTURE OF INNOVATION THROUGH DESIGN

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Abstract

'Creating Cultures of Innovation' is a unique design intervention project that works with Scottish businesses to explore how to apply design approaches to transform in-house innovation capacity, boost employees' use of skills, increasing motivation and productivity and providing creative leadership to support collective solution generation. Our research was developed from the findings of the Cox Review (2007) which defined '*Design…, that which links creativity and innovation*.' Therefore, our hypothesis was could design act as a vehicle to support improved innovation capability in SMEs. This paper is a case study of our work with a Scottish company and our collaboration to understand how we might build the capacity for *sustainable innovation*, where creativity is permanently embedded in flexible, multi-disciplinary teams.
We will discuss key findings exploring and explaining the methodology, approach and give a general insight into how this case study furthers our understanding of how organisations build up resources for innovation. Integral to this is an understanding of how we make effective use of established knowledge, insights and expertise, and liberate (or at least tap into) knowledge, skills and competences that reside within firms. (Paton & Karunaratne, 2009)

Key Words: Creativity, culture, innovation

INTRODUCTION

Design Innovation

Innovation, the successful implementation of new ideas, is an important driver of economic growth. Successful innovation creates customer value through new products, services and processes, giving rise to new markets and economic growth, as well as contributing to higher productivity, lower costs, increased profits and employment. The central role of innovation in creating future prosperity and quality of life is widely acknowledged and accepted. The OECD Innovation Strategy (2010) highlights that innovation drives long-term economic growth, and states that:

> *Innovation ...has long been viewed as central to economic performance and social welfare and empirical evidence has confirmed the link between innovation and growth. This means that all governments must understand the importance of innovation, and develop policies to stregthen its efforts and outcomes*

Innovation is at the heart of European and UK economic development policy, and is a major focus for investment across the UK. In addition to its growing importance and profile, innovation theory and policy has also evolved in line with developing thinking about the scope and nature of innovation in a modern economy. The linear model of innovation through science, R&D and technology development has been augmented through the exploration of open innovation models, the importance of the creative economy and interdisciplinary approaches. NESTA were at the forefront of exploring, and bringing to a wider policy audience, these ideas in the UK. Their publications (Harris & Nightingale, 2006 & Harris & Halkett, 2007) and the resulting discussion highlighted that the traditional view of innovation as a pipeline process based around commercialising scientific or technological invention needed to be supplemented by a broader understanding that innovation is not necessarily linear and reaches far beyond the production of products, involving a diverse range of actors and inputs with different perspectives.

> *Innovation often comes from looking sideways, to seek ideas in adjacent fields or disciplines, which when abducted into your own domain might yield new insight or combination. This process of combination often relies on people who span different*

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> *cultures and disciplines and spaces where ideas and people mingle ... Creativity comes from interaction and dialogue between different ideas not just from diversity alone. (Leadbetter, 2006)*

Consistent with a broader definition of innovation our work explores its multiple-drivers, social, cultural, organisational as well as technological. Explicitly, within the work of cultures of innovation, we seek to investigate the interface between employee engagement and a capacity for sustainable innovation. Our research was developed from the findings of the Cox Review (2007) which defined 'Design…, that which links creativity and innovation.' Therefore, our hypothesis was could design act as a vehicle to unlock existing skills and knowledge to support improved innovation capability in SMEs.

ORGANISING WORK FOR INNOVATION

> *'To be creative people have to think differently. To be innovative people have to behave differently.' (Vonn Stamm, 2008: 3)*

While we see a growing recognition for a broader understanding of innovation, this is not as yet necessarily reflected in our organisational structures, and their innovation strategies, which are the outcome of complex interrelationships many of which can be traced back to influences forged during the industrial revolution. They are characterised by centralized hierarchies, with power coming from the top and delegated down and work organised through a structure of command and control. (Malone, 2004) However, the digital revolution is disrupting and rendering the traditional models for organising work as inadequate to address today's challenge. The C21st innovative organisation not only has to produce a flow of innovative products and services; but also is actively cognisant that they must innovate who they are and how they do things to adapt and learn for survival in an unpredictable environment. As Christensen (2003) says the challenge for companies is to rebuild ships while still at sea. Therefore, it is vital to develop an understanding of how organisations build up resources for innovation and integral to this is an understanding of how we make effective use of knowledge, insights and expertise, and liberate (or at least tap into) knowledge, skills and competences that reside within firms (Paton et al, 2009). To do so firms must loosen reliance on 'Taylorist' principles of organising work and behave dynamically; Malone (2004) proposes a management style, from which controls to one, which cultivates the organization. By this he means to discover and encourage its positive potential and purposely that of its people. We are beginning to see forms of organising work that favour a more decentralised (Malone, 2004) approach which enables interactions between those with diverse experiences and competencies which are arguably more creative when it comes to generating new ideas, while those that delegate problem solving to a wide range of employees may be more successful at turning ideas into new products and processes. For example, the OECD's 2010 report on innovative workplaces found that

> *in nations where work is organised to support high levels of employee discretion in solving complex problems, the evidence shows that firms tend to be more active in terms of innovations developed through their own house creative efforts.*

The need to rethink how we organize work for innovation is led by a technological disruption however; technology only enables change if wedded to people's need and desires. We see growing recognition of the importance of non-economic goals (Malone, 2004:34) and the need to understand the social goals like creativity, personal satisfaction and freedom in how we begin to

reorganize for innovation, to do this we must become mindful of the social fabric* of the organisation and recognise culture as a powerful and sophisticated agent (Alvesson, 2005). Furthermore, to unlock creative potential we should take a situational rather than a dispositional view of leadership in order to enable a field of 'creative leadership, by igniting the collective creativity of the organization from the bottom up' *(*Radjou, Prabhu, Kaipa, Ahuja, *2010)*. In fact the need to 'take advantage of people's true intelligence and creativity becomes one of the most critical capabilities of successful businesses.' (Malone, 2004:153). Therefore, our research seeks to understand '*a culture of* innovation' as a complex adaptive system that have a large numbers of components… that interact and adapt or learn (Holland,2006) in this case we are interested in the components that are the human with all its behavioural vagaries, as we seek to understand what are the methods that could unlock the creative capability and collective wisdom of the group. For as Stacey (2005) suggests, 'innovation is pursued as the novelty that emerges from conversations collaborations in dynamic, non-linear, networked communities*.'*

THE SMALL TO MEDIUM ENTERPRISE (SME) & INNOVATION

As stated earlier, successful innovation gives rise to new markets and economic growth, as well as contributing to higher productivity, lower costs, increased profits and employment. These outcomes are critical to sustainable economic development, which is exaggerated in the current economic crisis. Our work is focused on exploring stimulating innovation in a Scottish context and in particular but not exclusively with SMEs. SMEs are a major force behind Europe's economy, constituting more than 99% of all enterprises in the European Union; they provide around 65 million jobs and make an important contribution to entrepreneurship and innovation (European Commission, 2007). While it is recognized that economic growth is dependent on innovation, SMEs in Scotland are often not as innovation active compared to their US and European counterparts and find increased barriers to implementing successful innovation strategies. In addition, the SME is significantly more resource constrained than their MNC counterparts so launching an innovation programme is higher risk. Cultures of Innovation is a partnership with the Institute of Directors, in order to stimulate demand for innovation we needed be part of 'networked communities' to engage in conversations and build trusted connections. The selection criteria were based on identifying the 'curious', that is those who were open to the risks associated with innovation. How those participating described this process:

> *'Initially we met to decide if there was a potential for marriage. Sometimes the concept of installing innovation can be too radical for some more professional businesses. Similarly, bringing tools and techniques from academia into the real world is not without stress and strain. Our two-way learn-as-you-go attitude was vital in developing the open nature of the program.' Company participant*

METHOD

Scott & Fyfe (S&F) are a long established textile manufacturing company. Originally focused on jute manufacture, the company today produces highly technical material in multiple processes. The company had identified the need for an improved new product development process to meet the increasing demands of customers and address the issue of shorter product life cycles. The previous 4-5 stage NPI process was largely reactive, responding to customer enquiries. The CEO, a relatively recent appointment, was interested in exploring ways of initiating new ideas in what was a traditional, family owned manufacturing culture. Consistent with Silverman's (2005) view of qualitative research we worked with a small case, sacrificing scope for detail to provide proof of concept for the hypothesis that design thinking and methodologies could help improve the performance of SME's through building better cultures of innovation. The research solely utilised

* Social Fabric is here described as levels of trust, shared norms and values, interpersonal obligations and expectations and the shared representations, interpretations and systems of meaning embodied in shared codes, languages and narratives. Kay, N

qualitative approaches and tools to gather 'stories of change', capturing the behavioural changes within the companies involved. Qualitative methods are consistent with our understanding of innovation as a social-cultural phenomenon. *'Qualitative researchers stress … the intimate relationship between the researcher and what is studied, and the situational constraints that shape inquiry. They seek answers to questions that stress how social experience is created and given meaning."* (Denzin & Lincoln, 2000:8) The research explored the parallels between learning in the workplace and design methods; they are both a cycle in which experience is translated into concepts, which in turn are used as guides in the choice of new experiences (Kolb, 2004). By using the design methods and approaches as our research tool we tested the creation of a 'learning space' to use content (a strategic objective) pertinent to the partner organisation and apply learning activities (use of capabilities) relevant to the organisation and as such its performance. As such design was the vehicle to help unlock these capabilities within the organisation. The 'learning space' was constructed through the design of a series of bespoke, integrated design innovation workshops for a cross-functional team encompassing a 'diagonal slice' of the workforce. In these workshops design-led activities were employed to facilitate team and individual learning. The workshops would be a 'dry-run' to familiarise participants with a different way of doing things, followed by its application workplace to real business issues. In addition they were encouraged to engage wider than the workshop group to 'ripple' the effect out into the organisation. Data was collected through participant observation and self-reporting during and between the workshop series and the business was asked to create its own internal measures to evaluate progress. In addition, purposeful sampling of participants before, during and after the series was carried out, this work is ongoing as part of a longitudinal study.

Selecting participants for the intervention

Just as we had sought to find the curious at firm level so we sought the curious at individual level. We wished to encourage participants to look 'sideways' (Leadbetter, 2006) to stimulate new combinations and collaboration. Therefore, we asked for a cross-section based on different departments, length of service, gender, place in the hierarchy. In addition, we asked for characteristics such as open, passionate, willing, good communicator.

One of the key learning's to come from the pilot was the importance of selecting the right group at this stage. These individuals need to be motivated, curious and also credible within the rest of the organisation. A 12 member, multidisciplinary team was established taken from a 'diagonal slice' of the company, across all business functions and different levels of staff and management (although not the CEO). A call to action was formulated:

> *"To grow and secure the business as a centre for excellence in Tayport by creating cross-functional teams which share experience and contribute to how we commercialize NPI."*

This sentence was communicated by the CEO to the team of 12 and formed the rational for the Cultures of Innovation initiative.

DISCUSSION

Design as the vehicle

Over a period of 8months at intervals of once a month the team underwent a series of workshops with the GSA design team (figure 1), always off-site to enable the team to focus on the task in hand and not be drawn back into day-to-day operational activity. As part of these workshops they were introduced to design thinking approaches (examples shown in figure 1), and allowed to test them in non-work environments, before applying them more directly onto work related issues, as the *quick*

wins and the *slow boils*. They would present progress back at the following workshop. The team were incentivised and allocated time by the organisation for these tasks. During this process we experiment with how to enable a journey in thinking differently and then behaving differently, it is an inclusive and iterative process and we as researchers are learning in this process about what does and does not work. To illustrate some of the experiences over the 8month period we discuss three examples of activities and the subsequent outcomes in the next section.

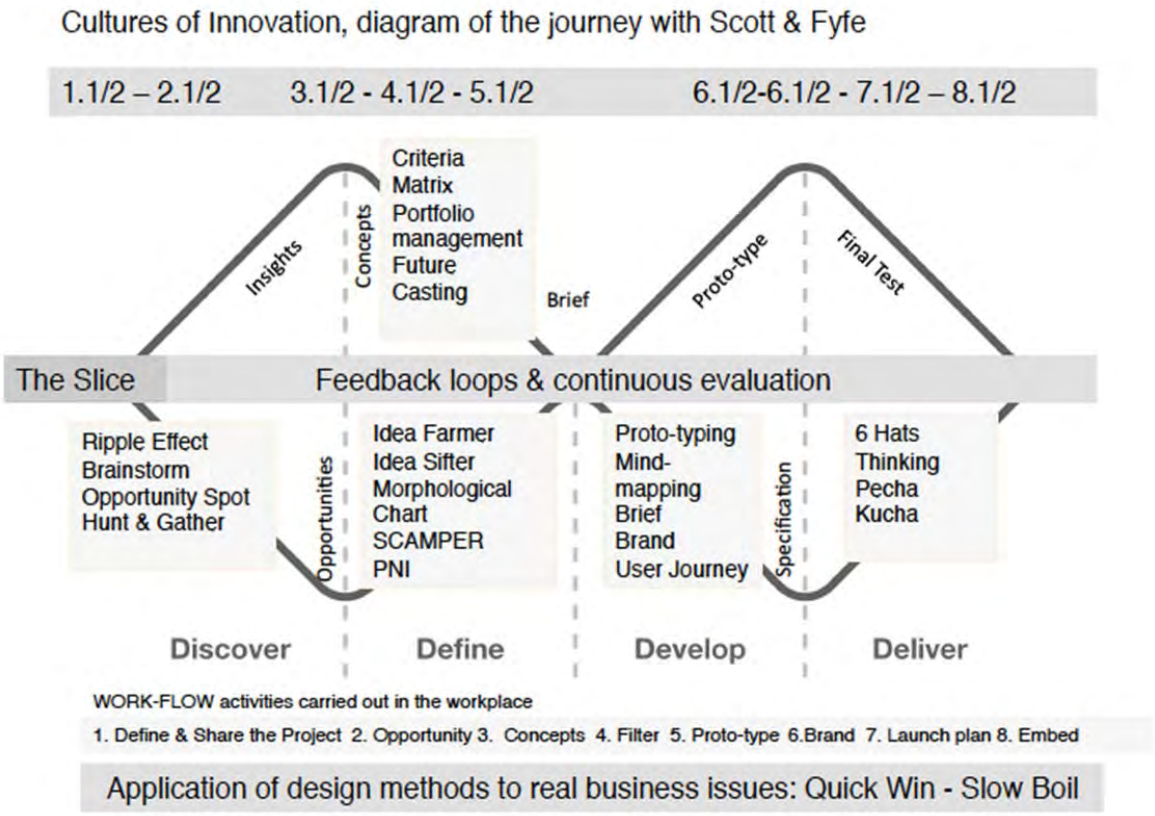

Figure 1. The Design Intervention programme as carried out with Scott & Fyfe. Overlaid on the Design Council Double Diamond model of the design process

Stimulating new conversations in the organisation

As Stacey (2005) suggests, 'innovation is pursued as the novelty that emerges from conversations collaborations in dynamic, non-linear, networked communities.*'* Therefore, an opening and ongoing task for the team is to create a collective identity and to shape feedback loops in the organisation to engage and communicate with the wider organisation through out the journey, and tap into grass-root activity we call this *the ripple effect*. The name created by the team was NOW, New Opportunities Within, and the NOW team identified a development space alongside the shop floor to enable prototyping of new product ideas, and to make the work of the team more visible and accessible to the whole company including, importantly, the shop floor. Delivering *the ripple effect* was not unchallenging for the team particularly the shop-floor staff. However, the evidence suggests the ripple is effective, with methods being shared with broader group than the original 12, e.g. through self-initiated peer-to-peer learning and in day-to-day operations e.g. shop-floor workers who have a wealth of knowledge of materials and production are contributing, including outside of work, in development projects. In addition, 'cultures of innovation' at Scott & Fyfe is called the NOW process. The *ripple effect* has contributed to a more distributed leadership model with insights and actions on business improvement coming from across the company,

> *'Innovation is a bumpy road, as you work through this process more and more people gain an opportunity to use the voice they have always had, but never used. As a result more people need to be listened to and responded to. This increase in the dialogue, leads to in hard honest debate… dialogue is the fuel for our fire' Company participant*

Significantly, an unforeseen outcome of the process was Scott & Fyfe's decision to convert the old Jute mill, which sits at the centre of their factory into an open studio for project-based working.

Encouraging learning from prototyping

Business is uncomfortable with failure, however successful innovation relies on experimenting and learning from failure, if your organization can adopt the concept of *'intelligent failure' (Sitkin,1992),* it will become more agile, better at risk taking, and more adept at organizational learning. To nudge this thinking we facilitate a design workshop called *the marble run*. The purpose is to encourage a prototyping mind-set allowing the team to begin to learn how to fail fast without wasting time, money or resource. We set the teams the challenge of building 3 versions of a marble run; which become increasingly difficult, are time constrained, and we celebrate the greatest failure. Our aim is to illustrate, prototyping can take many forms allowing you to create variations of an idea to test before further development without wasting any expense or time but delivering great insights.

> *"We used to see the failure to complete or develop a product as a bad thing, even if it was not commercially viable, we just couldn't fail! Through our collaboration with GSA we have learnt that it is better to realize faster that a product does not warrant continuation, allowing us to divert resource to another product that has a better chance of success. Failure is not negative as long as it is recognised quickly. Learning from 'fast failure' helps evaluate potential solutions before processing the final product, therefore have a better chance of developing faster and more successfully. We do not waste time and resource on projects with low success rates. " Company participant*

Fostering greater collaboration and new combinations

As to be expected business function and information silos prove to be a constant stumbling block for the team, with inherent tensions between sales, production and development. However, the fundamental building blocks of an *innovation system*, involve the connections between the components that ensure the flow of information necessary for innovation to take place (Metcalfe, 2007) how do we start to break down barriers and increase connections. We introduce simple visual tools such as mind mapping, as a way to make thought processes explicit, encourage collaboration and reveal hidden knowledge. In addition, we introduce de Bono's 6 Hat thinking (1999), as a way of encouraging the team to carefully think together and to be conscious of different contributions and perspectives. Over the course of the programme, the team use both methods to change the perception and dynamic of these tensions. For example, there is a long-standing problem with machine time for sampling, production runs the machines and are reluctant to stop production to test development products. The team decide that they need to get the two sides together, also evidence of the ripple approach, and facilitate a solution-focused discussion on how to satisfy the needs of production and development. Several discussions and many mind-maps later production and development are working cross-functionally to deliver goods on time and space to experiment with new products. A similar approach is taken by the team to address the silos that exist between sales and development; where there is not a tradition of sharing knowledge and insights with colleagues resulting in missed opportunities, limited market focus and misunderstanding customer needs. Cross-functional working, learning from prototyping and distributed leadership have currently contributed to 50 new products ideas and 10 new products in development.

"We have shop floor operators who have set up their own innovation blogs, completed market assessments to select our new French distribution and designed a marketing campaign for a key market segment. Such is the power of Embedded Innovation." CEO Scott & Fyfe

THE LEGACY

'Significantly, the intervention has left a legacy of on-going development activity, with the innovation team at … becoming permanently embedded within its everyday practice.' SKOPE Evaluation

It would be foolhardy when looking at 'culture' to think that we can isolate the changes at Scott & Fyfe just to their participation in cultures of innovation, as we have stated ourselves organisation are complex and dynamic system that involves multiple interactions and components. At the time of our collaboration with S&F there were multiple interactions at play that shaped the transformation of business, this is as it should be. However, table 1 illustrates there has been a considerable shift in how S&F describe themselves and the approaches they take to organising work towards a culture of innovation.

Table 1: Observations and reflections on the characteristics of the organisation during the process.

Who we were:	Who we are becoming:
Reliant on customer enquiry	Insight gathering
No market insights	Opportunity spotting
Information silos, not shared	Cross functional activity
No 'stop' button	Learning from prototyping failures
Ad hoc & unfocused development	Strategic development
Top down leadership	Distributed leadership

Crucially, the NOW approach has led to a redesign of working practices across the company. Prior to this S&F had a traditional, hierarchical and function based organisational structure as illustrated in figure 2.

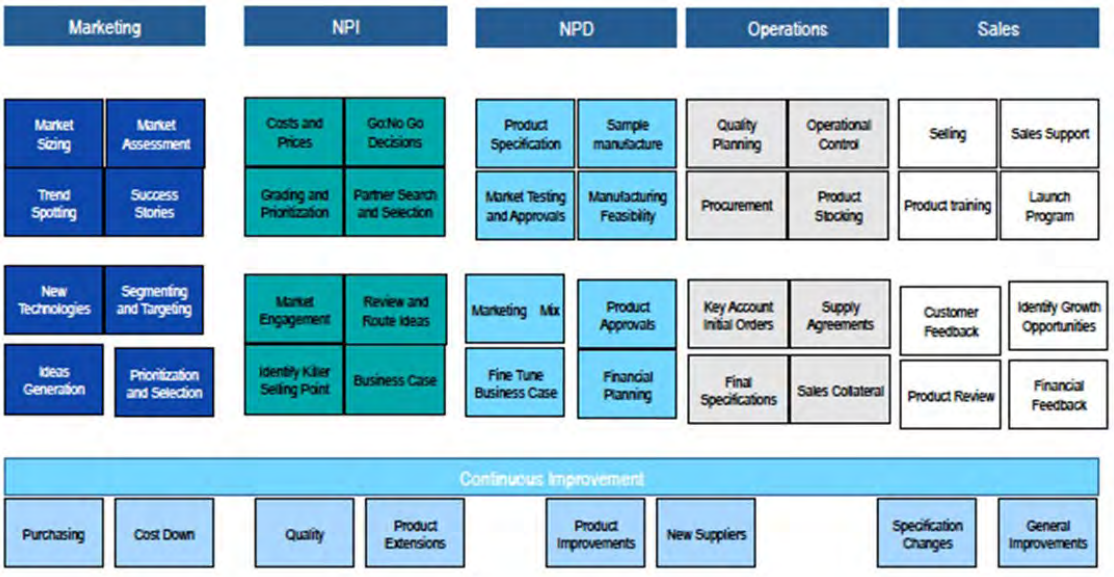

Figure. 2. Scott & Fyfe organizational structure before, traditional hierarchy & functional silos.

There are now four ‘Pods’ (figure 3) operating as separate and independent business units, responsible for making profit, dealing with its own budget and coming up with new business. They are supported by an ideas generation process, called the ‘Innovation Cloud’ which uses many of the NOW tools to generate new ideas; these are then taken forward by existing or new Pods as appropriate. The overall process is overseen by an Innovation Executive who ensure that the Pods are all on track and identify and tackle any problems. In addition support functions finance, technical and sourcing work across all the Pods and deliver services as required. S&F new structure can be seen as decentralised, a network of components and interactions.

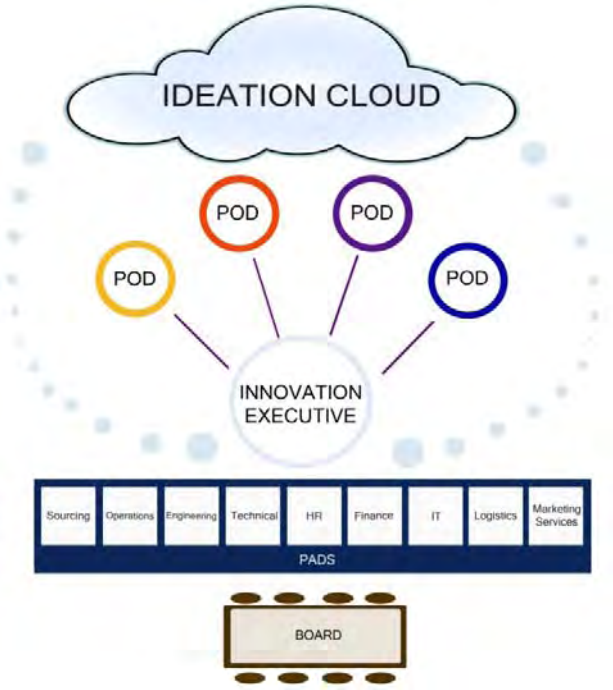

Figure 3. S&F organisational structure post intervention, decentralised with project based business units

> *“Before, Scott & Fyfe was like an old Bentley on a journey to somewhere new and exciting it had never been before. With reputation and success in the past, the only problem was we hadn’t had a service for a while, we kept running out of fuel and we would take the wrong turning and direction at times. Having had a service, a full tank of fuel and a built in Sat Nav we are now on the journey with a clear direction ahead. We also have breakdown recovery with supportive tools to help us on our way.” Company participant*

It is worth noting that the journey itself was not always easy. There were challenges as new ways of thinking were developed, challenging conventional models and ways of working within the organisation. In addition, even when the group was collectively agreed on a course of action, selling it and convincing the rest of the organisation was a challenge, including the CEO. The innovation journey is not linear; it is often random, iterative with periods of extreme uncertainty. Participants describe ‘light-bulb moments’, or moments of clarity, when the applicability of the learning suddenly makes sense and becomes relevant to the work context. Other such moments highlighted a realisation of the role that they themselves had in developing and maintaining a certain culture, or way of working, and thus the role that they now realised they had to play in the change process. One of the key elements in changing behaviours in the programme was exposure and awareness of a different way of working. The design thinking approach builds in time to experiment and prototype rather than a rush to action, which was the modus operandi for many SMEs. Taking time to explore, research and test potential solutions, and the concept of ‘fail faster’

were highlighted as key learning moments. The design process also encouraged the teams to think about the whole process and the impact of a decision upstream and downstream rather than just the immediate impact. By testing and trying new tools in a safe environment, away from the immediate pressures of the workplace, confidence was built which allowed the creative, solution-focused mindset to deliver some inventive results. This differed to the problem-focused attitude that was the norm, where every challenge is immediately raised as a barrier to success. The case prototyped the methods and techniques of design innovation and has proved successful; with Scott & Fyfe successfully developing and implementing a new approach to new product innovation. This includes a redesign of working practices across the company. This has, in effect, changed the company approach to innovation to fully integrate design innovation as core to their business. The CEO described this as 'embedded Innovation'. This radical change in structure, demonstrates a fundamental understanding that the organisation must not only innovate products but also itself; perhaps Scott & Fyfe are learning how to do 'to rebuild ships while still at sea' (Christensen, 2003) through design.

> *"We couldn't unlock the door to innovations, as we didn't know where it was. Now we have identified the door and we have the key." Company participant*

CONCLUSIONS

> *What is a culture of Innovation: ' It's a freedom of thought, freedom of speech and freedom of action. It's imagining tomorrow and making it happen today, safe in the knowledge that we are dynamic, empowered and flexible to adapt, once the future unfolds. In essence we were shooting for an oxymoron organized right-brain thinking.'*
> CEO S&F

We set out to investigate could design act as a vehicle to support improved innovation capability in SMEs. Our method was founded on an understanding of innovation, as non-linear concept which recognises the importance of creative, interdisciplinary approaches and that it is actions are wider than just new products or services. In this context, we took a view of culture as a sophisticated agent, that businesses must recognise in order to enable greater innovation. Design was our vehicle for this journey and our findings make a valuable contribution to the wider innovation debate and in particular to understanding how we stimulate collective creativity, to foster a culture of innovation. We trialled these methods with two other companies, whilst it is prudent to be clear of the limitations of the study and recognise this was a developmental pilot project, we can also drawn substantive observations and recommendations. In particular, its contribution in furthering our understanding of the role of employee engagement to innovation and how we might go about shaping both a practice and policy landscape that has a more holistic understanding of how to stimulate sustainable innovation capacity.

Our work highlights that in formulating an understanding of how we transform in house innovation capacity, the experience of the individual is critical. Their behaviour will in term inform the collaborations, interactions and conversations that form the wider behaviour of the organisation. Our findings show that participants have gained confidence to contribute and share ideas, notably as highlighted in this case study they are more comfortable taking risks within an appropriate context and embrace change where necessary. This is supported by improved conditions for collaboration and effective communication; through mixing hierarchies and disciplines the widest possible use of skills within the participants was drawn out. To effectively use the skills of all employees exposing them to different perspectives and environments challenges silos and self-limiting thinking, which has lead to better decision making and engaging in collective problem solving, with a corresponding reduction of perceived barriers between workplace 'silos'. These findings are consistent with more decentralised or discretionary working practices and

recognise the importance of the non-economic motivations. Crucially, they reveal the development of a better awareness of their own skills and the capabilities of others, which are contributing, to a culture of continuous learning and career development. In fact, many of the team members have now expanded roles, exploiting the wider capabilities uncovered during the process. Significantly, for the businesses this is leading to greater organisational ambition, thinking more creatively about potential new products, services and markets coupled with greater market awareness, which allows for more effective opportunity spotting. Critically, what we see is more engaged and involved employees who are enthusiastic about the business performance and are motivated to contribute to its success. This highlights the role of distributed leadership, while the traditional concept of a company leader is recognised as important in initial engagement and for on going support. Vital are leaders across the organisation that engage, catalyse change and embed practice; decentralised ways of working are about *'… the participation of people in the making of decisions that matter to them … roughly the same thing as freedom.'* (Malone, 2004:5).

Importantly, we found that businesses still demonstrated a product-focused approach, revealing often a lack of user focus in the innovation approach. Bringing design thinking skills to the teams helped move the focus externally, improving innovation strategies and potential changes in products and services. The design process also encouraged the teams to think about the whole process and the impact of a decision upstream and downstream rather than just the direct change. A common barrier to innovation is fear of failure. Using design techniques to test and prototype in a safe environment, before taking forward to the workplace allowed the teams to be more experimental and radical in their thinking. This helped them move from a problem-focused attitude that was the norm in the workplace, to a solution-focused mindset to deliver some inventive results.

Although, this was only the initial pilot it has been viewed as a success, not least by those companies engaged in the process in addition it provides us with rich case study evidence to formulate methods and conditions that are mindful of the social-economic nature of organisations in reorganizing for innovation. In addition, it begins to explore how organisation can become actively cognisant that they must innovate who they are and how they do things to adapt and learn for survival in an unpredictable environment. Consistent with our understanding of a culture of innovation as complex adaptive systems; we see this work as about understanding and establishing conditions in which components can interact, adapt and learn; seeding an ecosystem rather than a one size fits all approach . A further stage is now underway involving a larger group of companies to further test the approach. In addition the approach is also being used in other ways, for example to work with groups of organisations in particular sectors in Scotland to develop new collective innovative cluster interventions.

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Matthews, J., Bucolo, S, and Wrigley, C. (2012). *Challenges and Opportunities in the Journey of the Design-led Innovation Champions*. XX – XX

CHALLENGES AND OPPORTUNITIES IN THE JOURNEY OF THE DESIGN-LED INNOVATION CHAMPIONS

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Queensland University of Technology

The purpose of this study is to deepen our knowledge and understanding of the challenges faced by design champions in proposing and applying design methods and insights in existing firms. This study investigates the early stages of the journey of the design champions as they incorporate design into operational and strategic conversations and practices and progress in mastering these challenges as opportunities in a firm context. Little research on this topic has been reported, yet it is of growing interest as more firms turn to design-led innovation to shape their strategies and practices. Interviews with design champions were used to investigate first hand the experience and reflections the many challenges provide. Findings from the study provide some early insights that can be extended through further research.

Keywords: *design, design led innovation, design champions,*

INTRODUCTION

Design plays an important role in business, not limited to new product development (Bruce & Bessant 2002). Contributions from design and design thinking have made big changes in how firms carry out their work at both operational and strategic levels (Bucolo et al. 2012; Ravasi & Lojocono, 2005).

In particular, design has also been adapted and nurtured by business strategists in a relationship that brings new forms of strategy and new ways of working (Liedtka, 2010; Liedtka & Ogilvie, 2010). Within companies that have made the decision to transition and become design-led are those leaders who facilitated and made such a change possible. The term *design leader* is sometimes used to describe this role, but the authors believe that it is more than just leadership with design capabilities that is required, as this term implies primarily to an advocacy role. In addition to advocacy, the role requires a deep understanding of operational requirements, business needs, and strategy and is therefore a more *design interpreter* who can influence and synthesise opportunities across organisations.

This paper reports on the journey of these '*design champions'* embedded inside companies as they experiment with and move towards embedding these approaches with a view to becoming design-led. i.e. to apply design approaches to the strategic level as well as the project level. This paper outlines some of the challenges, gaps and opportunities that arise on this journey and how they dealt with various tasks along the way. It also outlines the barriers that these design

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champions face internally and externally in getting buy-in from the rest of the company and contributing to strategic implementation. Strategic design within a company has now become more accepted and some companies use design more strategically by placing it at the heart of their business and engaging managers and their cross-departmental teams in collaborative workshops (Ward, Runcie & Morris, 2009).

BACKGROUND OF THIS STUDY

Previous research found that the first step to embedding design capability in smaller enterprises is to show managers that design can be used as a tool for business growth (Ward, Runcie & Morris, 2009). In this context, a 'user experience' focus encourages companies to look beyond their obvious customers and dig deeper into user insights and meanings. In contrast, this study investigates the role of design champions in large enterprises with a view to identify similarities and differences from previous research.

There is some discussion about the suitability of the terms 'promoter' or 'champion' in terms of influencing innovation in companies (Rost, Hölzle & Gemunden, 2007) in the innovation literature. Rost et al, (2007) challenge the notion of champions (Schon, 1983) instead of promoters, but we have chosen to use the term 'champion' to describe the role of designers who promote a design approach in firms.

CONTEXT OF STUDY

A group of design champions participating in an industry collaborative project meet regularly over a twelve-month period to discuss progress on applying a design approach in their firms. The design champions are nominated and sponsored by the CEO and senior management as representatives of their companies, to participate in design-led innovation processes. This entailed regular meetings with staff from other companies about design and its potential for projects and strategies. This paper reports on a progress of a design led innovation process conducted over a twelve month period in one company. Applying Schon's Reflection in Action paradigm we investigated the reflections and experiences from the design champion's perspective.

METHODOLOGY

The key stakeholders involved throughout this period were interviewed to trace the progress of the change of the company, as well as deeper investigation of the experience of the design champion. From a larger practice group formed to investigate the application of design led innovation we began with individual and group interviews of participants. Interviews were recorded, transcribed and analysed for themes. The semi-structured interviews were also informed by a timeline to visually represent issues, events and changes over time, at the project level and company level.

We examined the nature of the journey from the perspective of the design champions, the initiating factors and the drivers of their project and their hopes and expectations. Furthermore, we investigated the processes used to capture the changing nature of their work, the critical incidents of their journey and their understanding of the changing understanding of the company and new strategies and practices that are now in place.

We set out to interrogate this journey and investigate what design processes were used such as narratives (Beckman & Barry, 2009; Denning, 2005), customer touch points, and personas, the ways in which such processes are used in the journey, and how they have shaped the engagement of the company over time. However our interviews are still in the early stages of this discovery journey and further information will be obtained as the journey unfolds.

FINDINGS

The interviews provided a rich source of information about the design champions' thoughts and feelings about their successes and failures in experimenting and applying design methods in their work with customers and in compiling observation and insights to develop new ideas for product

packaging for the company. In addition, their involvement in the next steps for design-led innovation as well as their hopes and fears for engagement over the long term were discussed. We present the findings around the notions of challenges, gaps, opportunities and barriers.

CHALLENGES

Some of the challenges in the organisation in the previous 12 months include positive influences such as the addition of a senior manager who was familiar with design and the potential of this approach of adding value to projects.

> *(There was a) change of leader and change of opportunities. First of all, we've got a new leader and we recognised that we had a lot more value to add and we weren't adding it, so that's great.*

In addition, design champions were encouraged to continue their work with design methods and contributions and to change in their own behaviour and articulate more clearly their potential contributions change in their own behaviour

> *We changed in how we carry out what we do - It's then -- part of it is the noise we made ourselves and, you know, to (take those conversations further up the line)*

At different stages in the interview, the design champions expressed both confidence and lack of confidence regarding the design approach:

> *I feel prepared enough to use the design approach in a project but I am not sure of all the tools*
>
> *I am not prepared but feel more confident how to press this new way of working.*
>
> *I know what the outcome should be ……...*
>
> *I see a change in the our way of working .. In the past we would have jumped to a solution whereas now we are prepared to go on a journey to unpack it a bit and then put it all back together*

GAPS IDENTIFIED

At the time of interviews, the design champions were developing their own abilities to embed design into their projects. They understood that the company was reconsidering the strategic positioning of the company and the project, as well as focusing on cost- cutting activities. However, the design champions were still developing confidence in their abilities to use design and at this stage did not have faith in their possibility of influence at anything past the project level.

> *It's all incremental- there is nothing ground breaking. If there is a big distinction between design-led innovation and something that is incremental innovation, I don't think there is anything of a breakthrough nature there.*
>
> *So I feel like this year we have kind of grabbed at things, we have been playing grabbing and there are a few things fumbling along. For next year it's the brand planning sessions are under way to fill the pipeline for the next year and the year after.*

Discussions about design led innovation with these design champions are very much focused on the projects. There is some understanding that the design way of working can both challenge and enable a new strategic approach to business for the company. However the need for such an approach is not yet apparent and needs to be led from the CEO and senior management team for effective outcomes.

OPPORTUNITIES IDENTIFIED IN THIS JOURNEY

Design champions recognised their potential to add value through presenting a 'different' way of working and the need for them to speak up and speak out about new ways of working. For example, aligning their design methods with a dominant approach of the notion of 'natural' when

applied to packaging as well as to the product appeared to bring their ideas to the attention of the senior manager of marketing. The ability to tap into the meaning of products gave them confidence about pursuing this approach. The design champions could identify situations and contexts where their insights, knowledge and skills could add particular value to framing conversations around packaging and sustainability"

> *So if there is some opportunity then what we do in terms of 'natural', packaging can tie into that.*

Design champion practitioners engaged in design processes with their firms, also expressed a range of cognitive and emotional responses to their work and progress. Where they could identify progress they could discuss what sort of progress and some of the factors that had lead to that progress. Where they were not satisfied with their progress, they questioned their own possibilities for further action and found it difficult to see past the roadblocks to progress the work. Both practitioners felt they had come some distance in their knowledge and application of design methods and were happy about this progress.

They expressed some feelings of progress and satisfaction about working in new ways:

> *In the past we would have worked in one way focusing on cost and time; now we can take a different approach.*

However, reflecting on their progress to date, they also expressed reservations and hope for the future.

> *So I feel like* this year we have kind of grabbed at things, we have been playing grabbing and there are a few *things fumbling along. For next year it's the brand planning sessions are under way to fill the pipeline for the next year and the year after.*

The design champions also discussed the temporal nature of their processes and the challenges of presenting a new way of working as well as new perspectives on issues, but being under pressure to deliver in existing structures.

> *So at the end of the day we still have to deliver against what is required of us. So we are still struggling with just to keep up to date activities. ...And there are a number of challenges to be faced"*

BARRIERS TO CHANGE

The design champions identified some barriers to change within their organisation as they attempted to apply design methods to their work, and develop closer links across functional areas;

> *"The inability for us to get appropriate resources within our company to follow-through with the process properly, rather than rushing through to solutions based on cost and time".*

The organisation structure and its organisational culture and boundaries can present as barriers from structural constraints and past practices:

> *"It is extremely difficult to change culture and break down silos. It is also difficult to change a department's role in business and easy to blame other departments as there is a lot of power in the traditional approach".*

In addition, changing the views and mindset of the people within the organisation was not an easy task. One development they identified as positive was the appointment of new experienced staff who had worked with design and knew its potential from other contexts, and some came from a strong customer alignment, but needed more flexibility in their approach.

> *"it's a mindset built on knowing how to understand your customer – not a step by step process that is followed every time. This is a reflection of the diversity of products and services and customer problems to be satisfied".*

DISCUSSION

From these preliminary interviews we propose that the activities undertaken by design champions in large organisations may be somewhat different to the activities undertaken by design champions in small and medium size enterprises. In large enterprises the design champion is often not a senior manager and does not have the full support from senior executive about the change required to become design led (although there may be some exceptions). Therefore the support required is to both grow capability of design-led innovation and also to assist in managing up to demonstrate the value to the CEO / Senior executive team. See Figure 1.

In contrast, there is a very different dynamic in small and medium enterprises, where the initial support of the CEO is essential, often through a design mentor, and then this CEO identifies the design champion and provides the support to allow them to implement. See Figure 2. The design mentor in this case then provides additional scaffolding to this person as required, but the sponsoring of the design by the CEO reduces issues around change management.

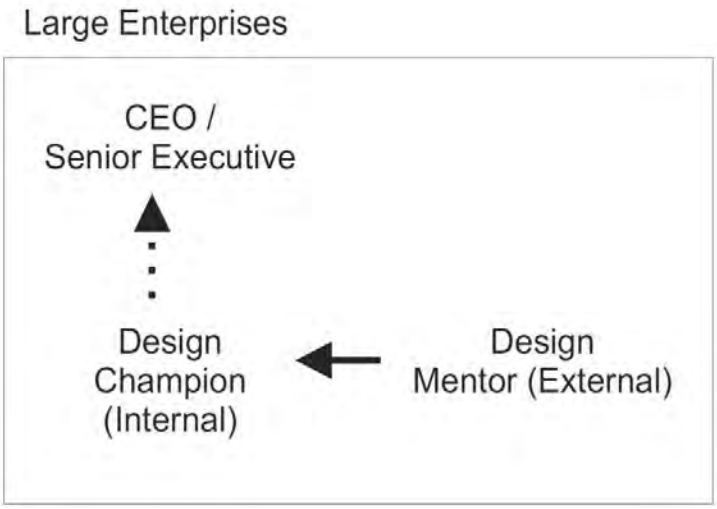

Figure 1 Large Enterprises Design Champion

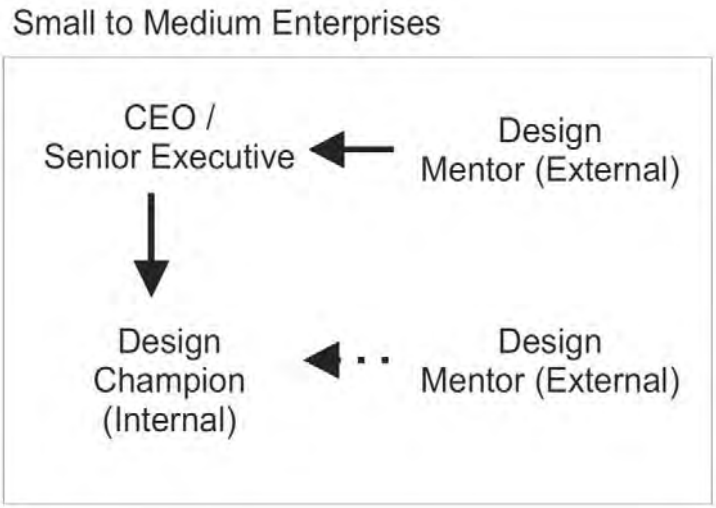

Figure 2 Small to Medium Enterprises Design Champion

There are some similarities in the change processes used by design champions in large enterprises with well-established models of organisational change such as Kotter's Eight Step model (Kotter, 1996, 2007). The challenges faced by design champions also have some similarities to the recognised change processes in organizational development literature. For example, design champions need to be sensitive to crises that require new responses and ways of working - both as opportunities and challenges. In this organization, a new CEO had been appointed and the company was rethinking its business and business model. Design champions need to act as promoters and work in teams with other professionals and colleagues (forming a coalition). They also need to clearly articulate the outcomes they are seeking and include stakeholders in developing solutions.

Another area of difference identified in this study is the new and more challenging role for the external Design Mentor in supporting design champions in large enterprises.

LIMITATIONS

These exploratory interviews were carried out with a small sample of practitioners engaged in applying design principles and methods in their organisations. While the sample size is small, this study does provide data that has not been previously captured or made available and is a early step in documenting these processes. In addition, the study of design champions is continuing to map the processes and outcomes of change. These interviews were conducted early in the design implementation process and may not reflect the final outcomes.

CONTRIBUTION TO THE FIELD

Design led innovation is a field of growing interest but our review of research has found few studies that describe or analyse the processes used, at both the operational and strategic level. This study provides insights into the challenges that design champions face as they work with companies to apply design processes across their business. The research also provides a unique opportunity to present the detailed actions and activities undertaken as well as an analysis of the design champion's journey. Enabling a better understanding of the barriers these design champions face so they can better equip themselves to turn the barriers into opportunities and embrace the journey to its full potential – becoming a design-led company. A previous study of design-led innovation (Bucolo et al 2012) built on previous research in small enterprises (Ward et al 2009) and argued for the importance of specific leadership capabilities for design interpreters. We propose that design champions also benefit from the following leadership capabilities in the context of large enterprises.

DESIGN THINKING IN A CROSS FUNCTIONAL TEAM

As previously discussed (Bucolo et al 2012) the design champion's first responsibility is to focus on her team and 'maximise the effectiveness of the team's skills and knowledge and to supplement this with new skills and knowledge where gaps have been identified'. In this study the role of the design champion is to ensure the team is familiar with and confident of their understanding and their ability to frame new possibilities.

ALIGNMENT WITH COMPANY VISION AND OBJECTIVES

The second leadership capability focuses on aligning the identified competitive advantage to company strategy and brand values, thereby further strengthening the competitive differentiator of the idea. In this study the design champions identified the strengths of linking their projects to the broader notion of 'natural' in packaging to differentiate products in the market. The design champions in this study increasingly demonstrated understanding and confidence in their potential to add value as their projects progressed. This capability appears to be developing as application of design methods generates new insights that are then valued in the company.

KNOWLEDGE OF CHANGE MANAGEMENT PRACTICES

The third leadership capability to be employed by design champions in large enterprises is to build on knowledge of change management practices to form a larger group and encourage engagement with design processes.

IMPLICATIONS FOR THEORY AND PRACTICE AND FUTURE RESEARCH

The application of design-led innovation appears to be gaining attention as companies seek to differentiate their products and services, often in selected niches, in fast-moving global markets. Design champions working with small companies have demonstrated important gains and improved company performance. However the activities of design champions in large enterprises tends to occur under 'commercial in confidence' arrangements, and has only recently gained public attention. The early findings from this research illustrate that similar but different processes are needed for design-led innovation in large enterprises that can be informed by change management theories and practices. Future research with these and other design champions in large enterprises and with the roles and contributions of the design mentor in large enterprises will assist in defining and further articulating more precise findings and recommendations for practice.

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UNDERSTANDING THE SKILLS OF DESIGN LEADERS

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Recently design leadership has received increased attention, particularly in relation to knowledge intensive organisations such as retailers. However, to date little is known about the nature of individuals in these vital positions. In response, this study aims to identify the skill sets of design leaders in fashion retail. Empirical data was collected during interviews with 20 design leaders in seven UK-based international retailers. The results reveal distinct skills and patterns from those previously reported in design leadership and broader leadership literature. Predominantly, these relate to what we term 'designicity', as design is imbued into all aspects of leadership. Hence, this research contributes to knowledge by more clearly defining the need for formal design education in design leadership. By delineating design leaders in this way, greater clarity is also provided for industry.

Keywords: Design leadership; Fashion retail; Skills

INTRODUCTION

Fashion retailing exhibits a high degree of environmental velocity (McCarthy, Lawrence, Wixted & Gordon, 2010), which necessitates enhanced design capabilities (Cachon & Swinney, 2011); particularly where retailers have adopted private label/own brand strategies (McColl & Moore, 2011). These design resources are predominantly internalised (Abeccassis-Moedas, 2006) to differentiate and value engineer products and respond to shortening life cycles (Christopher, Lowson & Peck, 2004). However, optimisation of these assets is contingent upon effective design leadership (Lee & Cassidy, 2007). Design leadership according to Topalian (2011) is the most advanced state of design 'responsibility' within an organisation.

Yet, to date little is understood of the skills of the individuals responsible for leading design. Indeed, several authors suggest a background in design is *not* a prerequisite for design leaders (Jozaisse, 2011; Topalian, 2011). Analysis of skills provides a proven approach to explore leadership in general (Katz, 1955,1974; M.D. Mumford, Marks, Connelly, Zaccaro & Reiter-Palmon, 2000a; M.D. Mumford, Zaccaro, Harding, Jacobs & Fleishman, 2000b, M.D. Mumford, Connelly & Gaddis, 2003; T.V. Mumford, Campion & Morgeson, 2007). Thus, this study explores design leadership by investigating skills.

This paper is structured as follows; first, relevant literature is reviewed, identifying the gap in knowledge that the research question aims to address. Next, the methodology adopted is described in relation to this research question. Subsequently, the results are presented and then

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discussed in relation to the literature. Finally the conclusions are set out, providing contributions to both theory and practice, together with the limitations and suggestions for further research.

THEORETICAL FOUNDATION

Before reviewing the design leadership literature it is appropriate to briefly describe the nature of fashion design. Fashion, according to Lawson (2009) is a distinct design discipline, which in relation to other areas is 'expressive, emotive and subjective' (Tether, 2005:14). Designers in this domain therefore not only create material artefacts in the form of apparel - clothing, footwear and accessories (Hines & Bruce, 2007) but also add the intangible element of fashion (Kawamura, 2006). Kawamura (2006) describes this as the embodiment of symbolic meaning as unique combinations of aesthetic, technical/craft and social elements are embedded as encoded language (Barthes, 2006). By its nature, fashion is 'temporarily adopted', diffused and subsequently discarded (Sproles, 1979:4) so design operates in inherently unpredictable environments (Christopher, 2000). Consequently, design leaders require the wherewithal to respond to these challenging circumstances.

However, design leadership literature is scarce and it remains a contested area (Jozaisse, 2011) with a lack of substantive research. A recent blog by Mike Press on the 2nd April 2012 summarised the state of discourse as 'the failure of…research and literature to connect with its professional constituency'. Although Press (2012) concedes in the same article that 'design leadership is fundamentally about empowerment, vision and driving change through design…and is about the primacy of values'. This supports Topalian's (2011) view, where design leaders proactively envision future scenarios and nurture creativity by embedding the design 'function' into organisations. Early advocates of design leadership Turner & Topalian (2002) provide a list of responsibilities as follows:

- Envisioning the future
- Manifesting strategic intent
- Directing design investment
- Managing corporate reputation
- Creating and nurturing an environment of innovation
- Training for design leadership

Yet, Topalian (2011: 380) states these individuals do not require design training, only an ability to 'inspire exceptional creative performance'. Jozaisse (2011) concurs with this view and also provides a list of seven design leadership qualities, some of which support Turner & Topalin's (2002) suppositions, especially in relation to empowering teams and embedding design awareness into an organization. Adopting Depak Chopra's acronym 'L-E-A-D-E-R-S', Jozaisse's (2011) list encompasses the following – Listen and look; Emotional bonding; Awareness; Doing; Empowerment; Responsibility and Synchronicity. For each of these Jozaisse (2011) identifies individuals that personify these qualities.

Adding to this approach, McCullagh (2008) selects 'ten faces' of design leadership, associating each with a group of notional design leaders and argues these share three common qualities; first they are effective at envisioning the future and constantly seek new opportunities; second, they think strategically and identify the resources to develop these future scenarios and third, they understand how to lead, develop and provide inspiration to design teams. McCullagh (2008) also stresses while there is not a formulaic approach for design leaders, all must be successful in acting as agents that others follow. Of the limited empirical research to date, Lee & Cassidy (2007) use a behaviour-based approach to understand design leaders of Taiwanese industrial design teams and the conclusions support many of Jozaisse's (2011) assertions above. Interestingly, the notion of 'vision' is absent as according to these scholars the primacy of design leadership is principally to establish a structure that nurtures designers in their quest for creativity (Lee & Cassidy, 2007).

Other scholars put forward an alternative perspective by arguing design leaders are responsible for implanting design thinking (Gloppen, 2009) or a 'designerly' way of thinking (Haragadon, 2005) into organisations. Within this scenario, design leaders seek to encourage all within an organisation (including non-designers) to adopt the design process or design methodology as a way of thinking (Brown, 2008). Following a similar line, Beuker (2009) refining Best's (2006) approach, suggests design leadership is a state that evolves along a continuum from design management and advances through design thinking. Leadership in this view expands in relation to the degree of design impact on the organization and the degree of abstraction in thinking that this demands (Beuker, 2009).

Although the various positions above articulate what design leaders *'do'* in association with traits, qualities and behaviours, to date little addresses what skills are needed in order to *'do'.* Specifically, scholars indicate that design training is *not* a prerequisite for a design leader. Contradicting these views, practitioners David Sherwin and Justin Maguire of Frog Design in a 2010 weblog, argue design is central to design leadership. Furthermore, these respected individuals underpin this notion by providing a brief list of design leadership skills, derived from what are termed the 'innate' abilities of designers. Sherwin & Maguire (2010) suggest these include 'hard skills' including sketching to articulate concepts and disseminate information throughout an organization and 'soft skills' encompassing business writing and presenting in public.

Thus, a gap in knowledge is evident that shall be investigated using the following research question: *'What are the key skills of design leaders in large fashion retailers and specifically, do design leaders need design skills?'*

At this point it is important to provide a definition of the word 'skill'. Etymologically it derives from the Old Norse term 'skil', meaning discernment or knowledge (OED, 1989), though a widely used contemporary definition is a 'proficiency, facility, or dexterity that is acquired or developed through training or experience' (Merriam-Webster, 1986).

By exploring established generic leadership literature, a number of consistent themes emerge offering greater clarity. Skills provide a valuable perspective in understanding the nature of leaders (Mumford et al. 2000a, 2000b, 2003; Mumford et al. 2007) in creative (Byrne, Mumford, Barrett & Vessey, 2009), knowledge intensive industries (Puccio, Mance & Murdoch, 2011). Byrne et al. (2009) argue leaders of what are termed 'creative efforts' need to possess particular skills, as creative work is inherently complex, ill defined and time consuming. Leaders therefore require skills to structure the environment and process effectively. Simultaneously, according to Byrne et al. (2009) leaders must have skills that acknowledge that creative individuals require autonomy and a particular form of motivation (Amabile, 1997; Collins & Amabile, 1999).

Furthermore, leaders must possess creative problem-solving skills (Mumford et al. 2002, 2003; M.D. Mumford & Licuanan, 2004) to operate within these constantly shifting scenarios; in addition to being competent at 'scan[ning] and analys[ing] the environment' to structure, guide and evaluate the context for idea generation (Byrne et al. 2009). These evaluative skills are of particular merit as they allow creative leaders to actively contribute to the creative process (Mumford et al. 2003; Mumford & Licuanan, 2004). Notions of creative leadership (Puccio et al. 2011), in essence resemble the methodological approach, namely design thinking that Brown (2008) espouses, rejoining with the assertions above (Gloppen, 2009; Haragadon, 2005). In fact, scholars argue possession of these skills confers significant advantage (Puccio et al. 2011), by providing a leader with a form of 'power base' through which to influence more broadly (Yukl, 2006).

Much of the work of Mumford et al. (2000a, 2000b, 2002, 2003), Mumford et al. (2007) and Byrne et al. (2009) builds on the seminal work of Katz (1955,1974), who established the 'skills based approach' to advance understanding of management. Katz (1955,1974) argues skills are different from traits or qualities and Northouse (2010:40) provides a useful distinction – 'skills are what leaders can accomplish, whereas traits are who leaders are'. Mumford et al. (2007) develop this skill orientated construct through a study of US government personal. Skills are grouped into

four distinct categories – Cognitive, Interpersonal, Business and Strategic and a summary is depicted in table 1. In line with Katz's (1955,1974) view, Mumford et al. (2007) suggest leadership is available to all (Northouse, 2010), providing an individual has the motivation to learn specific skills.

Table 1 Synthesised summary of generic leadership skills by category: adapted from Mumford et al. (2007)

Skills category				
Skills	**Cognitive**	**Interpersonal**	**Business**	**Strategic**
	Speak (conveying information) **Listen** (actively) **Write** **Read** **Learn/adapt** **Think** (critically)	**Perceive** (socially) **Coordinate** (activity) **Negotiate** (reconciling differences) **Persuade** (changing behaviors)	**Analyse** (requirements) **Synthesise** (requirements) **Motivate/direct** (human resources) **Manage** (resources – financial/material)	**Envision** (scenarios) **Perceive** (changes in environment/ organisation) **Plan** (strategies/ activities) **Evaluate** (performance) **Identify** (consequences/ problems/solutions) **Appraise** (outcomes)
Outline of category	Cognitive skills are foundational and comprise those required in "collecting, processing and disseminating information and learning" (Mumford et al., 2007)	Interpersonal skills include those related to social interactions and "influencing others" (Mumford et al., 2007)	Business skills are aligned to the particular context in which a leader operates and include the management and optimisation of resources	Strategic skills are conceptual and include problem solving skills as situations are frequently complex and ambiguous - these enable a leader to identify and evaluate future scenarios and resource these appropriately

Returning to the original problem highlighted in the introduction, we now recognise fashion retailing is a high-risk design intensive industry (McColl & Moore, 2011), where survival in highly competitive markets is contingent upon effective leadership (Mumford et al. 2002, 2003, 2004). However, design leadership literature provides somewhat contradictory views (Jozaisse, 2011) of the nature of design leaders and specifically whether design skills are essential. Looking to generic leadership literature, leading scholars argue the study of skills provides an appropriate form of inquiry (Mumford et al. 2000a, 2000b, 2003; Mumford et al. 2007), as this offers an expertise based construct of leadership (Northouse, 2010). From this literature, we also derive a list of skills to address the empirical part of this study, using the methodology outlined below.

METHODOLOGY

Given the nature of the research, an interpretative philosophy was adopted (Robson, 2006) with a broadly qualitative methodology. This approach is appropriate as the study explores practitioner's perceptions in response to the research question introduced above.

Seven organisations were identified for the interview-based case studies and selection was contingent upon meeting the following key criteria:

- Large retailers i.e. employ over 500 people (BRC, 2010) and in-house design teams
- Significant own brand propositions (over 75%)
- UK-based international fashion retailers
- Recognised as leading in the particular market segment in which the company operates - these 7 are classified as either affordable luxury or mainstream; all have received industry recognition through extensive fashion media citations and numerous design awards.

Together these retailers represent approximately 30% of total UK turnover of clothing and footwear based on 2011 data (Verdict, 2011).

As the main researcher has a background in the retail industry, access was initially arranged via personal contacts and thereafter through snowball sampling (Robson, 2006). Twenty separate semi-structured interviews were conducted between March and July 2011, with the senior individuals responsible for design (table 2); these individuals typically have job titles such as Design Director or Head of Design. Given the scale and complexity of these organisations, some are structured with multiple business units e.g. Womenswear, Menswear, Childrenswear, Accessories etc, so a number of senior individuals lead design. Retail fashion design teams are hierarchical and typically structured with a design director(s), head(s) of design, design manager(s)/design coordinator(s), senior designers, designers, junior designers, design assistants and support personnel. Additionally, some design directors lead teams beyond fashion design so are responsible for graphic designers, store designers and technologists.

Table 2 Summary of interviewees

Retail organisation	G	H	J	K	L	M	N	Total
Number of design leaders	2	5	3	2	3	2	3	**20**

Interviews were also undertaken with senior commercial executives in these organisations and 4 junior and 4 senior designers in four of them. Due to industry sensitivity all references are anonymised. Interviews with the design leaders lasted between 60-180 minutes and employed a graphical technique to elicit and visually represent responses (Crilly, Blackwell & Clarkson, 2006); using cards developed by the researcher (each card represented a skill derived from literature). This method ensured data was collected without *a priori* assumptions and actively engaged practitioners in the research process (Van de Ven, 2011). Interviewees were asked first to describe their education and experience, before they were requested to broadly describe their role and position within the organisation. Next, they were invited to articulate their perceptions in relation to their current skills before the skill cards were introduced.

Using the set of skill cards, the interviewees were asked to describe how they related to the skills presented. Skill cards could be rejected or additional ones added within this process if the interviewee perceived they either could not relate to a particular skill or felt a skill was missing. Blank cards were provided for this purpose. One card in the pack also denoted the term ‘me’ and this was provided so the interviewees could position the skills in relation to themselves. Interviewees were invited to arrange the skill cards onto an A3 sheet in whatever format they felt appropriate and these were then taped down. Subsequently, interviewees were instructed to rate their *current* level of skills on a scale of 0-10 (there was no limit to the number of times any score could be used). This scale allowed a fine level of granularity to be achieved. Through this process each interviewee produced an individual skills ‘map’ and an example is illustrated in figure 1. All interviews were recorded and transcribed in preparation for analysis.

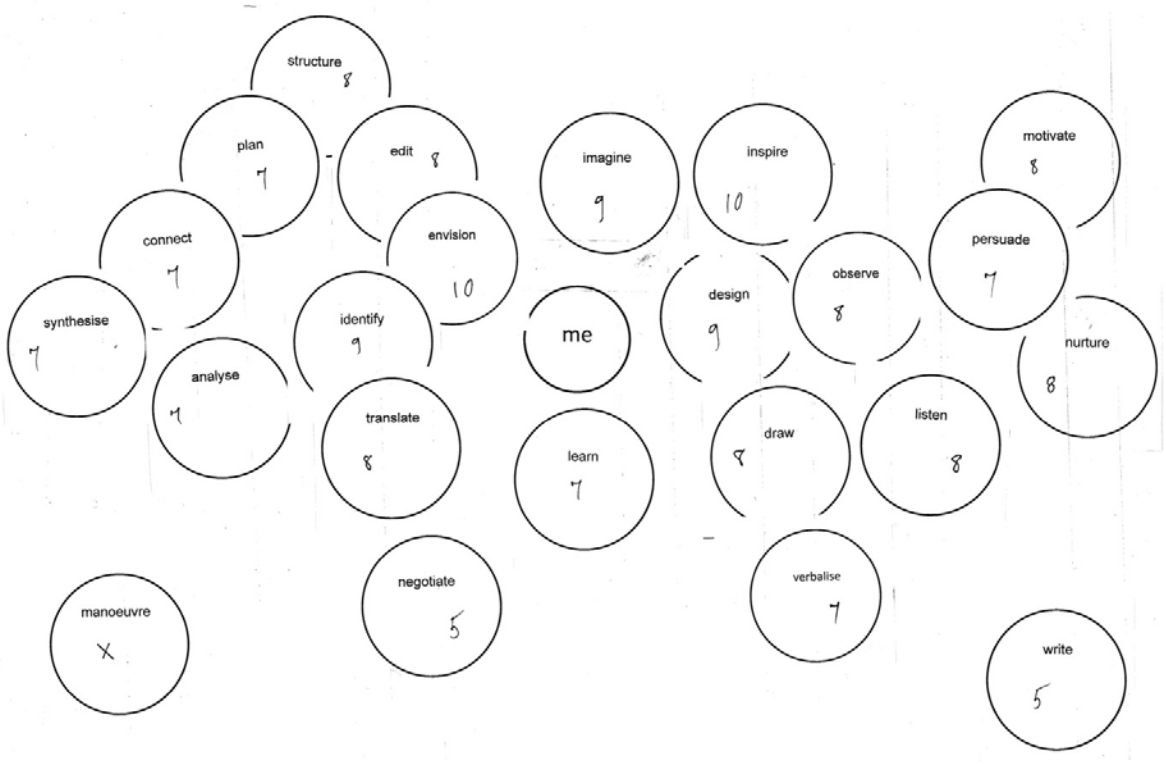

Figure 1 Example of an interviewee's skills 'map'

DATA ANALYSIS

One stage of analysis involved aggregating the numeric data from the interviewees' scores for each individual skill. Average scores were then calculated for each skill and a simple visual representation of the results was produced (figure 2). A secondary element of analysis involved mapping all 20 layouts from the interviews to determine if common clustering of the skills was evident - from this figure 3 is derived.

Qualitative data collected both during the interviews and from secondary sources such as media reports/company reports were subject to open coding using Atlas (a qualitative data analysis software system). From this inductive process the researchers identified common themes on how and why interviewees related to the skills. The descriptive data also provided greater richness, underpinning the numeric and clustering analysis. Where appropriate, a selection of verbatim quotations is included in the results section to help explain the reasoning of the design leaders.

RESULTS

First, the numeric data shown in figure 2 will be explained, followed by a brief overview of the skills clustering (figure 3). Next, the verbatim extracts from the interviews are introduced to elaborate on the key themes that emerged.

RANKING AND RATING OF THE SKILLS

From the analysis of the numeric data shown in figure 2, with a rating of 8 and above, certain design centric skills were highly rated by all interviewees and these include *imagine*, *inspire, envision, design* and *draw*. Also above 8, were *motivate* and *nurture* and these represent the interpersonal skills; the term *nurture* is particularly interesting and is explored later in this paper. In line with findings from Mumford et al. (2007) certain cognitive skills have high scores above 8. Surprisingly, of these *draw* was the highest at 8.25 with *verbalise* and *listen* also at 8. Two strategic skills were highly rated, namely *identify* and *plan*. Overall the majority of the skills had low levels of

variance between the interviewees' scores. But, the weakly rated skills – *negotiate* and *manoeuvre*, both had a high degree of variance. For example one interviewee scored the latter with a 7 whereas another gave this skill a 0. In addition, certain skills i.e. *read* and *appraise* derived from literature scored so weakly that these are excluded from the results. Others including *manage* and *evaluate* were implicitly understood and enfolded into other skills so are not described in detail in this paper.

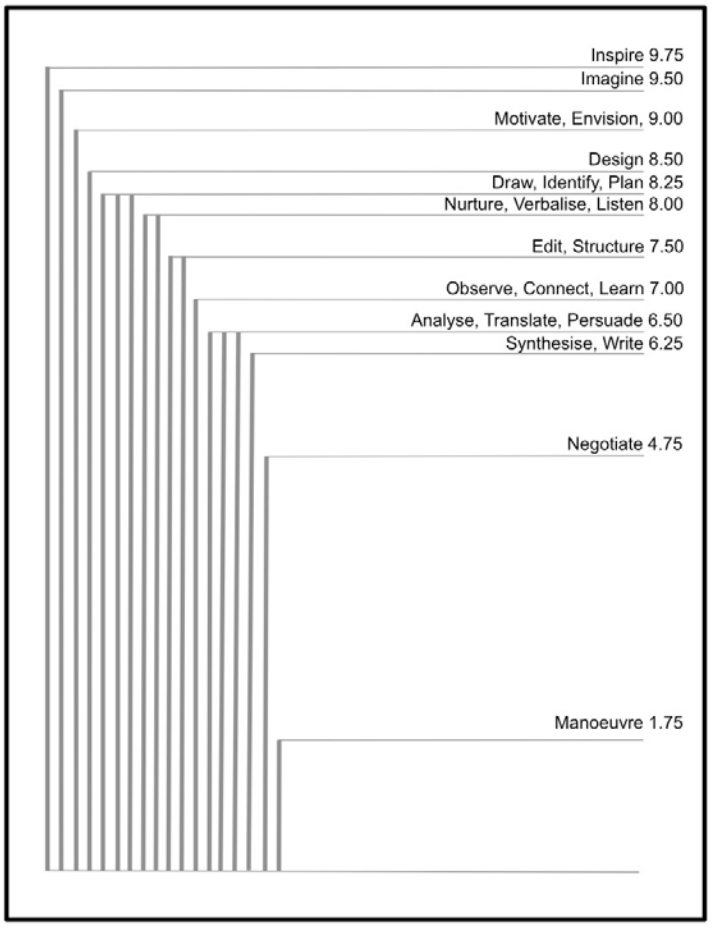

Figure 2 Scores for Design Leaders' skills (#No. 20)

From this set of results, design leaders perceive they have a very strong set of design related skills closely aligned to key interpersonal and cognitive skills. More weakly perceived skills align to the business and strategic skills category derived from Mumford et al. (2007) in table 1, again these findings are discussed below. Looking at the overall weighting however, the scores reveal that these individuals perceive themselves as adept at a broad range of skills and this is supported not only by the interview extracts, but also by senior executive, design team member and media evidence.

SKILL CLUSTERS AND CATEGORISATION

From the data elicited in each of the mapping exercises consistent patterns in the clustering of the skills is evident, even where interviewees arranged the cards in a linear fashion. For example in figure 1, the design orientated skills encircle and are closest to the 'me' card with people related skills clustered towards the upper right quadrant. Following analysis, five clusters (categories) emerge (figure 3) of which four broadly correspond to the categorisation that Mumford et al. (2007) propose. These four also correlate with the category ranking put forward by Mumford et al. (2007), with the strongest being Cognitive skills, followed by Interpersonal skills, next the Business skills and then the Strategic skills.

What emerges most emphatically however from the analysis is a distinct ‘Design’ skills category and this was consistent for all of the interviewees. In terms of the positioning on each individual’s skills ‘map’, these cards were consistently positioned in closest proximity to the ‘me’ card. In addition, interviewees frequently placed certain other skill cards adjacent to this Design category within the clustering, for example the cognitive skill *draw*. Moreover, certain skills were referred to as links or bridges by the interviewees. As an illustration, *plan* acts in this fashion between the Strategic, Business and Design categories according to a proportion of the interviewees. By inference this suggests that whilst key categories can be discerned from the data, in reality there is a great deal more fluidity in how skills are perceived in practice. This supports the suppositions of Mumford et al. (2002), who argue by nature this is an area of inexactitude and inherent complexity.

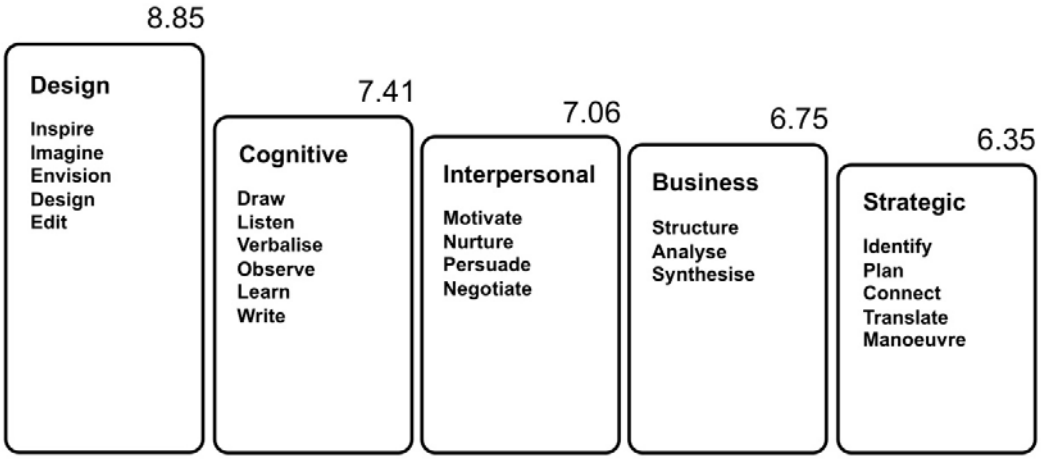

Figure 3 Skill categories and overall scores by category for Design Leaders (#No. 20)

However even with this fuzziness, given the overall weight of evidence we argue a new category of leadership skills namely ‘Design’ is justified. Initially these design centric skills were considered as additional ones that nest within the Strategic category. But, upon reflection this appeared a poor fit. First, because this encompasses distinct skills that the interviewees describe as core to design and these were grouped as a cluster. Second, these are used within a design leadership context by the interviewees. Third, looking for example in detail at *envision* there is a design orientated specificity provided here that contrasts with the construct positioned in generic leadership literature. Fourth, the skills other than *envision* are strongly identified in design literature, but not in leadership literature. By highlighting it as a distinct category, we therefore propose it more accurately reflects the nature of the skills of design leaders based upon the evidence of this study.

DESIGN SKILLS

Looking at the overall score (8.85) for this category (figure 3) in comparison to the others, this is evidently perceived as core to design leaders. All five skills were rated above 7.5 and four of them - *inspire, imagine, envision* and *design* were consistently the highest rated overall. Within the results is evidence that these are *the* essential skills that define design leaders, as the ability to ‘metamorphose’ a desirable imagined future state to an actual state is of fundamental importance. What is also revealed is how the five skills in this category are closely interrelated so we also see a level of complexity as this comment reveals:

> *‘Inspire, envision, design, imagine and edit are really the big part of it. It’s tricky to separate them really’ (L2)*

In terms of *inspire* three different elements emerge, first this relates to teams:

> *'Basically I have a way of taking something out of the ether, then I brief it and use whatever taste I've got to put the magic dust on it… and because I love working in teams… inspiring people is a really important part of what I do.' (N1)*

Second, it extends to inspiring customers and third, there is an element that enables these individuals to seek inspiration as a Design Director explains:

> *'I find inspiration all around…everywhere…in art, music, architecture and travel. I look to a childlike approach…with freshness and continual questioning' (K1)*

Drawing inspiration also connects with having the potential to *imagine* the future as this interviewee describes:

> *'Every season it's like a blank canvas before you paint…That's what's so frightening about the fashion business. Every single season you start from nothing, although you have some bestsellers. But you pick bits from the stratosphere and draw them in…' (N1)*

Another positions this from a slightly different perspective by imagining they are the customer:

> *'What am I going to think? What are you telling me?... You've got to put the mirror back and think…What do you want them to see? What's the story? What's the new thing? What is the wow?' (J1)*

All interviewees scored the skill *envision* strongly and evidently a great deal of time is spent 'casting' into the future in line with the dynamics of the fashion industry as this extract reveals:

> *'I just couldn't do my job well without being able to envision – we never stand still and say "Oh that's good"… It's never right.' (M1)*

One Design Director links this to a deep understanding of customers:

> *'I would say this is tied to my ability as a designer. I instinctively know what excites our customers…You form a picture from…thousands of little scraps of ideas and knowledge of what works and build a sort of model in your mind…' (G1)*

Evidently there is also a level of complexity within this ability to *envision*, that relates to the nature of the organizations in which these design leaders operate:

> *'We're a huge business… we have sub-brands and [we] want them [customers] to go back in [to stores] and although there is a broader vision of fashion… I've got to apply that to all these sub-brands.' (H2)*

From this trajectory, *design* as a skill is introduced as according an interviewee:

> *'There is something about that kind of craft, taking your "vision" and converting it to an actual product' (N2)*

Overall as a skill, *design* appears to be the core proficiency for all these individuals, as within this category it bestows design leaders with the ability to convert the abstract nature of the previous three skills into a commercial reality; in addition it evidently connects strongly to the other skill categories. Furthermore, *design* as a skill is deeply rooted in the craft and symbolic nature of fashion as the example below illustrates:

> *'Obviously I have a skill, which has to do with…how to build a garment, the importance of proportion and scale and cutting and fabric. You couldn't credibly lead a design team without having this skill…'*

The interviewee goes on and describes how this skill is consistently and extensively utilised:

> *'I'm working on next year's collection. In fact…12 collections. In addition to designing the clothes [there is the] in-house shop design and graphics.' (K1)*

Design also takes an indirect perspective for certain individuals where the scale and remit of the role precludes direct involvement. However, in this extract one Head of Design explains how the Design Director constantly uses this proficiency:

> *'We show her every design brief…we probably spend 6 or 8 hours going through the…trends, colours, fabrics and patterns. She has…very strong views. If she says she doesn't like a colour palette… we change it. People are very, very respectful of her design experience.' (H4)*

Finally, within this core category, having an aptitude to *edit* appears fundamental as it bridges between those others above and the commercial demands encapsulated in the Business and Strategic skills categories:

> *'So you have to go in there…take out and rearrange and give back a narrative. It needs a narrative…You can go from…thinking, our range is shocking. What are we doing? It's all gone wrong', to literally, an hour later, when it's…edited, saying, "It looks brilliant. I love it. It's perfect". You need that clarity for customers… there was a story there, but you couldn't see it…' (N2)*

COGNITIVE SKILLS

Several important points emerge from this category; first, these skills are highly interrelated, both with those in the Design category and in relation to others within this category. Second, with the exception of the ability to *write*, all are perceived as advanced. Writing for some is in-fact highly problematic due to dyslexia, a recognised condition for a percentage of designers (Wolff and Lundberg, 2002). Third, the distinctive design related skill *draw* was the most highly scored in this category and this is invaluable as a form of communication between design leaders and team members as this example illustrates:

> *'Basically, I think as a designer so it is about showing, or alternatively let me show you…it has a physical being. It could be an outline of a silhouette, but it is this need to experiment, to show…it's the idea… so don't talk about it, show it.' (G2)*

For others, this skill is also part of a critical thinking process as one design director sits with a collection of 10 neatly sharpened pencils on their desk and insists:

> *'I fill notebooks with my drawings and notes, I've got boxes of them. I think things through like this… what's the next collection etc.' (K1)*

In association with the perceptions towards *draw*, four other skills in this category are enmeshed with design. Of particular note are *listen*, *verbalise* and *observe* with individuals referring to these in somewhat unusual forms. Several for example articulated an ability to 'listen to fashion'- but, by using visual skills:

> *'I'm constantly tuning in to hear what products are communicating…so it's like echo sounding by sending out a beam of fashion communication and 'listening' to the response.' (G1)*

Beyond this the results reveal these leaders are consummate communicators with an ability to tune into the audience, whether, on a one to one basis or when presenting to large audiences. Building on this, the interviewees not only have an ability to *observe* as the quote above demonstrates, but are also able to visualise or 'look beyond'; or as one CEO positions it in relation to his design director having 'the seeing eye', which another interviewee describes as:

> *'A magpie's eye…. I look and see. A lot of people look but they don't see. You've got to have your eyes open…I can see how many stitches are needed on a jacket lapel. But I can also look at colours across a collection and gauge the balance. I can then say to the team "that's interesting… it works."' (K1)*

Design leaders as a result are able to *observe, listen and verbalise* coherently across a spectrum from the finest detail to the broadest scale – from a button to an entire business. Leveraging these skills enables design leaders to operate upwards, across and downwards within the organisation as well as externally to encompass customers, suppliers and the media. What emerges by inference is the multi-dimensional nature of the skills. Constant references for example were made to learning, storing and retrieving new and extant knowledge and using this facility to oscillate between the past, present and future. This is an important theme in relation to the Business and Strategic skills later in this section.

INTERPERSONAL SKILLS

Although the Interpersonal skills were not as strongly rated as the previous two categories overall, two were highly rated - *motivate* and *nurture*. Closer examination also reveals how effective design leadership is perceived as contingent upon the facility to *motivate* in high-risk organisations:

> *'I strive to push people out of their comfort zones, and encourage them to take on challenges…People get comfortable too easily and I can't let them do that in this unstable industry…In this "disequilibrium" I have to encourage people to be brave…' (H1)*

Others however recognise their weaknesses, with for example a propensity to *demotivate* as this Design Director outlines after scoring a 6:

> *'I can be belligerent… very demanding and sometimes… people are scared to make suggestions. I've got to be careful I don't become all dominating.' (J1)*

Here we reveal an important point, as critical reflection provides a capacity to recognise both limitations and strengths in self and others and this is vital within these organisations. Part of this relates to *nurturing* and all interviewees perceive this a key skill and the word itself is suggestive of the relationships that these design leaders construct both within the organisation and by extension to young design talent in universities. Moreover, design expertise is critical in identifying who and how to nurture as this interviewee outlines:

> *'I was talking to one of the young girls, Savannah…showing her the best sellers rail and explaining… how it's important for her to be aware of what's selling… so she can think oh, that shoes got a chain strap…that strap could go on a purse… But I explained it isn't a science and I'm here to guide her' (M2)*

The other skills, *persuade* and *negotiate* were more weakly perceived and this potentially relates to the seniority and expertise and ultimately the respect these individuals command.

BUSINESS SKILLS

Of the three skills within this category, *structure* was strongly supported at 7.5 while *analyse* and *synthesise* were only moderately rated. However, within the qualitative data highly developed business skills are evident. Potentially these differences may be explained by an implicit understanding of these commercial skills and a natural propensity to focus on creative ones. Hence, the scores may belie the true nature of the skills portfolio of design leaders.

Supporting this, according to results the ability to *structure*, bridges between the Design and Strategic skills and relates to the structuring of three distinct elements a) the product ranges, collections or brands b) the teams c) the broader business. Moreover, for these design leaders, structuring as a skill balances the inherently chaotic nature of fashion retailing as this extract demonstrates:

> *'I allow people to grow and to fly… there is freedom. Equally there is a…contradiction…there is a lot of structure that allows us control. Obviously as a designer I don't put structure high on my list. But the intellectual side of me will tell me that structure is very important' (M2)*

Another interviewee expands this:

> *'As the money [turnover] side grows…sooner or later the departments have to be split down. So I have just developed a structure for baby girls… divided into a jersey and a woven team… But, I can foresee the baby girls woven's team being divided again into two…that's how big it's become.' (J3)*

Analysing and *synthesising* are closely related and demonstrate how skills beyond design are imperative at this level, as this Head of Design explains how she uses commercial data and converts this information to align the team's priorities to maximise future sales:

> *'I look at what's selling… going through on a weekly basis…what colours, what people are buying as link sales [together] on the trading updates… working out how we react to those sales in terms of development…' (L3)*

Others position these skills as using embedded knowledge:

> *'It is very intuitive… we have to make decisions so quickly. I could take ages saying "well this may work or that may work"… But I can't do that here, although we are a huge... business, you just have to take the risk… as we have to be fleet footed.' (J2)*

Consequently, it may be inferred that these design leaders are adept at continuously processing design and commercial know how.

STRATEGIC SKILLS

Arguably by creating a separate Design skills category the Strategic group of skills is significantly weaker than predicted. Yet, the results support the findings of Mumford et al. (2007) in relation to the relative strength of the categories. In terms of the skills within this category, *plan* aligns closely to the findings in generic leadership literature and in the context of the fashion retail industry is regarded as critical in balancing inherently complex processes and extensive teams. Especially as many of the design leaders as outlined earlier, manage multi-disciplinary teams that are frequently globally dispersed.

Likewise the aptitude to *identify* is perceived as fundamental and relates to the isolation of key strategies that balance both design and commercial requirements:

> *'Having identified four key product strategies which would be top store, e-com, international and innovation that we can create a buzz around… I talked it through with the business. And together we then identified what we should get after and plot them… one, two and three years out. Then take it for the season as an overview - the fabrics, print, the styling, shape etc.' (H4)*

There is also evidence that this encompasses identifying design talent:

'In terms of what I am looking for, obviously #1 a brilliant designer, #2 somebody who is very commercial but can also identify a trend…someone who is really passionate' (H2)

Identifying external contacts including the media adds to the nature of this skill as the following extract illustrates:

> *'It's about results and spending the right time with the right editors and courting the relationships… so that's part of it too.' (J1)*

Furthermore, there is a degree of overlap with a skill that emerged through the interview process, namely *connect* and it is similarly multi-faceted. A key element is the ability to make connections between the history of the organisation and a future state as this interviewee describes:

> *'The thing is you have this continuity, holding the history of the company and its beyond design…its very valuable because it connects the past to the present… [and] most importantly the future.' (M1)*

Added to this, is an aptitude to *connect* across a business to ensure there is consistency and a commercial executive provides evidence of one design director's skill:

'She looks across all of the business at the clothing, the stores... She's got to have the perfect colour and everything. There is an awful lot of focus on the set up [products]. Are they done properly? The windows, the tickets, the point-of-sale, the photography…everything goes through this conduit.'

Others embrace customers as an integral part and here too is evidence of the symbolic meaning of fashion*:*

> *'It's the whole essence…I think our customers can see, we give them the spirit of our company through what we do… I can connect with them as like-minded people, giving them like-minded product, the things they want, beautiful things, when they want them.' (L2)*

Extending this further, fashion design knowledge is utilised to establish connections to both external fashion design experts and to universities as this Head of Design describes:

> *'Tomorrow I'm going to Central St Martin's to set up a fashion project and give them …direction, we will choose someone as a winner and give them a work placement. I think it's a nice link. I have relationships with the Royal College [of Art] too.' (K2)*

Of the other two skills put for forward by the interviewees in this category, *manoeuvre* was rejected outright by some and overall had a low score. This potentially mirrors the reaction to *persuade* and *negotiate*. Turning to *translate,* for the majority this is highly design centric and refers

to translating strategy up, across and downwards within retail organisation. Here, fashion design expertise enables conceptual ideas developed from a future vision to be translated into a form that others convert to a reality composed of tangible products, stores, packaging and the like. Part of this proficiency also revolves around communication so the complex interrelated nature of the overall skills portfolio of these design leaders is clearly evident.

DISCUSSION

Although design leadership has become increasingly recognised as an area of interest, to date little is known about the skills that design leaders possess. More specifically, contradictory views are held by academics and practitioners in relation to whether *design* skills are prerequisite. By investigating design leadership skills in fashion retailers through this empirical study, we argue it is now possible to more accurately represent the nature of design leaders. From this perspective several important themes have emerged.

First, we find design skills are central to design leadership in contrast to established scholarly views (Jozaisse, 2011; Topalian, 2011), upholding the assertions of Sherwin & Maguire (2010). Based upon this evidence, a distinct Design skills category in addition to the four categories of Mumford et al. (2007) is advanced, as we propose this more accurately reflects the nature of these skills. More specifically within the context of this study, these are fashion design skills composed of aesthetic, technical and craft elements. Possession of these skills provides a level of know how which is critical in complex, change orientated environments such as fashion retailing. This builds on the Mumford et al. (2000a, 2000b, 2002, 2003, 2004) assertions that leadership in situations of ambiguity requires a complex set of skills to deal with predominantly novel problems. Moreover, these skills in relation to leading design move from the abstract to the specific and tangible.

Thus, this study also fills a gap between design and leadership theory, as seminal design theorists Cross (2010) and Lawson (2009) argue these skills are activated in attending to the kinds of ill-defined problems evident in most design scenarios. Therefore, formal design education and experiential learning (Kolb, 1984) through extensive practice are prerequisites to effective design leadership in this industry. Indeed this assertion is supported as all twenty individuals fulfil these criteria. Moreover, formal recruitment to these design leadership positions is contingent upon meeting these requirements.

Second, this study reveals that design permeates across all of the skill categories, which lead us to adopt the term ‘designicity’ to describe this phenomenon. Here, fashion design knowledge is imbued into all design leadership skills. Knowledge derived from past experience reorganises schema (mental structures that enable cognitive processing) generating new ways in which skills can be applied (Mumford et al., 2000b). Connected to this is another noteworthy point, related to the interrelated and multi-dimensional nature of the skills and knowledge as these individuals cognitively oscillate across dimensions of time, space and scale. In so doing, design leadership may be viewed as a highly complex state, adding to both generic and creative leadership theory (Puccio et al. 2011).

Third, these individuals demonstrate a broad portfolio of leadership skills and this breadth is essential to leadership (Byrne et al. 2009; Mumford et al. 2000b, 2002, 2003; Mumford et al. 2007). Furthermore, balancing Design with the Business and Strategic skills appears essential as these leaders operate in highly competitive commercial environments. Whilst these latter two categories superficially appeared to be perceived of lesser import, on closer examination these are evidently critical at this level of seniority. Indeed, the more senior individuals in the study perceived themselves as having more advanced skills and this supports the findings of Mumford et al., (2007). Thus, continuous accumulation of skills and knowledge is both evident and desirable (Mumford et al. 2000b; Yukl, 2006).

Fourth and perhaps most importantly, these design leaders acknowledge the strengths and weaknesses of their skill ‘portfolios’ with a surprising level of critical self-reflection. These

'portfolios' appear to function in two ways; first, by clearly demarcating these leaders from other functional leaders within these organisations; second, these signify that these individuals are distinctive and in so doing are recognised as highly valuable by those in the organisation and beyond.

CONCLUSION

In this study, we began with a claim that little is understood of the skills of design leaders. Subsequently, a review of the limited design leadership literature was conducted and this elicited contradictory views pertaining to the need for design skills. Therefore a gap in knowledge was evident. A search of established leadership literature in relation to skills proved more fruitful and this provided both a list of skills and a skill categorisation framework. It then sought to investigate the perceptions of design leaders in a design intensive industry, namely fashion retailing, by adopting a graphical research technique. Skill cards developed by one researcher were empirically evaluated, generating both quantitative and qualitative data. Subsequent analysis produced the following overall findings:

1. Design skills are prerequisite to design leadership in these organisations
2. Design leaders are formally design trained and have extensive experience (circa 12- 40 years) and continue to advance through design
3. Design also permeates all of the skills therefore we adopt the term 'designicity' to describe this phenomenon
4. Based upon the findings above we argue a distinct category of Design skills is justified
5. In total 5 categories are proposed - some contain additional skills that enrich the overall skills of design leaders
6. Possession of a broad portfolio of skills is essential at this senior level - neither possession of purely design or purely business or strategic skills is adequate for effective design leadership
7. Design leaders exhibit a high degree of cognitive complexity

Finally, this leads us to challenge the current vogue of 'design thinking' as this study reveals design leaders are commercially adept design '*doers*'.

IMPLICATIONS FOR THEORY AND PRACTICE

This paper contributes to theory by providing new insights into the skills of design leaders in the fashion retail industry. In so doing, it more accurately depicts the nature of design leadership adding to theory in both design management and broader leadership. For practice, this study of exemplar organisations underlines the value of recruiting individuals possessing both a formal design education and extensive experience as leaders of creative teams.

It is however recognised that this study has limitations. Particularly pertaining to generalisability and the potential to extrapolate these results to a broader population. Inline with other leadership scholars, we also recognise the inherent challenges of classifying self-perceptions. We therefore suggest further research is conducted in other retail sectors or other fast moving industries. Additionally, it may prove valuable to conduct an empirical study using the same research technique to probe more deeply into the differences between design and generic leaders.

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Hoo NA, J. and Choi, Y. (2012). *The Future of UK Manufacturing: the Development of Corporate-level Design Policy for UK Innovative Manufacturing.*

THE FUTURE OF UK MANUFACTURING: THE DEVELOPMENT OF CORPORATE-LEVEL DESIGN POLICY FOR UK INNOVATIVE MANUFACTURING

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The competitive advantage of UK manufacturing has shifted towards advanced and high value manufacturing, but concern is growing for the future of UK manufacturing because of the increased capabilities of emerging economies such as the BRIC countries. To address this the UK government is encouraging innovative manufacturing development, such as creating research centres, where innovation is a key driver for creating and sustaining the competitive advantage. However, this research has found a general lack of design utilisation in UK manufacturing. According to many experts, extensive innovation can be difficult to achieve without design implementation throughout the whole company. This paper therefore aims to create a rationale for a corporate-level design policy, which encourages design-led innovation, to enable UK innovative manufacturing to reassert the UK's competitiveness.

Keywords: Design policy; innovation; innovative manufacturing

INTRODUCTION

The significance of design in the business context has recently expanded and is no longer simply about enhancing aesthetics and functionalities: desisgn has become an important factor in making business successful (Borja de Mozota, 1990; Press & Cooper, 2003; Valtonen, 2007). With this expansion, the importance of design management and 'Design thinking' has raised the issue the design process should be seen as more of a strategic business tool for increasing competitiveness (Brown, 2009; Martin, 2009) and enable enhanced and prolonged innovations for companies which use it. This change in the design paradigm has been noticed by business leaders such as Apple, Dyson and Burberry (DC, 2011) and is increasingly becoming an agenda companies take seriously (McCullagh, 2010). However, Cox (2005) and NESTA (2008) suggest that lack of design utilisation in UK manufacturing may become a pivotal disadvantage to achieving sustained competiveness in the complex global market. Effective design thinking convergence in strategic business management needs corporate-level policy, which guides the infusion of design both in new product development (NPD) and in the management of the business itself. Policy can be simply defined as 'a course or principle of action adopted or proposed by an organisation or individual' (OU, n.d.). Despite current studies of national (government) level design policies (Amir, 2004; Aranaga, 2005; Choi, Cooper, Lim, & Evans, 2011; Hytönen & Heikkinen, 2003) and a pan-European call for design policy development (SEE, n.d.), there is still insufficient research into design policy, let

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alone a corporate-level design policy. Research into design policy is important because it can nurture and promote design thinking in a whole company, from strategic to operational levels. While design can bring out the best in a company, corporate-level design policy will encourage manufacturing firms to embrace both technology-led innovation and design-led innovation. For innovative manufacturing companies which are more receptive to innovation, albeit technical and often passive (incremental) innovation, it will generate a stream of design-led innovation alongside technological innovation, enabling them to flourish more efficiently, and holistically exploiting their market potential. Through design policy, designers' creativity and innovation will be both better translated into products and reduce the cost of manufacturing better quality products, thereby generating higher profits. Researches have therefore been initiated on macro-level design policy for innovative manufacturing in the UK (funded by Brunel Research Initiative and Enterprise Fund (BRIEF), Brunel University) and micro-level design policy research, as part of the author's PhD research. The combination of these projects, led by both authors, are ongoing researches which will enrich the knowledge of design policy for innovative UK manufacturing. As part of these researches, this paper aims to create a rationale for corporate-level design policy for UK innovative manufacturing to become more competitive. Subsequently, in this paper the authors investigate (i) manufacturing industry in the UK, (ii) the definition of innovative manufacturing and the role of design in manufacturing, and (iii) design-led innovation and the rationale for a corporate-level design policy for UK manufacturing.

METHODOLOGY

The research had three key stages. Firstly, an investigative study of innovative manufacturing was conducted - including an overall perspective of the UK manufacturing sector - and definitions were established of advanced and high-value manufacturing, using literature reviews including government papers, journals, books and both on-line and off-line articles. Semi-structured face-to-face interviews were then conducted with academic experts in manufacturing to establish an initial definition of innovative manufacturing and its relationship with advanced and high-value manufacturing, as innovation has become an important agenda for enabling the success of these manufacturing companies. The second stage was to establish design's current role(s) in manufacturing, using an exploratory questionnaire survey with UK manufacturers to better understand their views on design and its importance to the company. For easy access and completion, an on-line survey tool was used to create and distribute the questionnaire, sent to 370 manufacturing companies, with 48 completed. The initial comparative analysis identified the differences between the 20 manufacturing companies which said they can be described as innovative manufacturers, and the 20 companies which said they can be described as something other than innovative manufacturers (non-innovative manufacturers). Semi-structured, face-to-face interviews were then conducted with 10 manufacturing companies' directors or partners to further investigate the use of design in manufacturing. The third stage of the research was a critical analysis of the results and a review of current corporate-level business policy and design policy. This final stage generated a rationale for corporate-level design policy in manufacturing, especially for innovative manufacturing, in the UK.

OVERVIEW OF THE UK MANUFACTURING SECTOR

The UK manufacturing sector, along with those of many other developed countries, is evolving. The growth of various manufacturing industries from 1994 to 2009 shows that the relatively 'high-tech' industries - including aircraft, rail, marine and motorcycles, chemicals, pharmaceuticals and biosciences, and medical and precision equipment - have expanded whereas relatively lower technologies - including leather products, and clothing textiles industries - have shrunk (BIS, 2010b). Fierce global pricing competition from the emerging "BRIC" countries (Brazil, Russia, India and China) is regarded as a major reason for the decline of UK manufacturing output. UK manufacturing's current competitive edge is recognised to be in high-value manufacturing, but the

BRIC countries are fast catching up with UK in this area, making the competition even more intense (BIS, 2010a).

This trend was predicted by the manufacturers' organisation, the Engineering Employers' Federation's (EEF) report 'Manufacturing at the Crossroad', which expresses concern that if the decline of manufacturing development is not addressed, the entire UK economy will suffer the consequences. In recent years, economic emphasis has undeniably shifted towards the service industries, which now represent 76 per cent of GDP, as compared with 13 per cent by manufacturing industries (WEF, 2010). The EEF followed the 2001 report in 2009 with a manifesto stating that the UK economy's heavy reliance on financial services has made it unstable and burdened with a large deficit (EEF, 2009). The UK government is now becoming increasingly aware of the importance of manufacturing industry for the growth and competitiveness of the UK economy. Consequently, the 2010 Growth Review states that the goal in the next ten years is to grow UK manufacturing (BIS, 2010a). Furthermore in 2011, the UK government started the 'Make it in Great Britain' initiative (BIS, 2011) which aims to transform the old image of manufacturing and promote UK manufacturing's earlier successes. As already described, UK manufacturing faces challenges in the rapidly expanding and increasingly competitive global market: the target should not be just to survive this hostile environment, but to gain economic growth and competitive advantage on the world stage.

INNOVATIVE MANUFACTURING IN THE UK

The UK government has identified the strengths and strategically important areas of manufacturing which need to be developed and supported in the future: advanced (BIS, 2009), high-value (TSB, 2011, 2012a) and innovative manufacturing (EPSRC, n.d.; TSB, 2011). The UK department for Business, Innovation and Skills (BIS) defines advanced manufacturing as the businesses which produce technologically complex products and processes by using a high level of design or scientific skills (BIS, 2009). Such specialised requirements mean that advanced manufactured goods and associated services tend to be of high value. The UK Technology Strategy Board's (TSB) definition of high value manufacturing indicates that it is 'application of leading-edge technical knowledge and expertise to the creation of products, production processes, and associated services which have strong potential to bring sustainable growth and high economic value to the UK.' (TSB, 2012:3). Advanced and high-value manufacturing both rely heavily on technological developments, but the key difference between them is that the emphasis of advanced manufacturing is on utilisation of advanced technology whereas the high-value manufacturing is more focused on economic growth and value. With the emphasis on advanced and high-value manufacturing, innovation has become an important agenda for enabling the success of these manufacturing companies. The UK government, through the Engineering and Physical Science Research Council (EPSRC), supports the innovative manufacturing by creating Innovative Manufacturing Research Centres (IMRC), now called Centres for Innovative Manufacturing (CIMs), at universities across the UK to take academic and industry collaborative researches to Technology Readiness Level (TRL) 3 (EPSRC, n.d.) where TRL 3 is an 'analytical and experimental critical function and/or characteristic proof-of-concept' (NASA, 1995:1). Innovative manufacturing is thus at the core of advanced manufacturing, enabling scientific and technological researches to be commercialised (EPSRC, 2011). Furthermore, it is an enabler for advanced manufacturing to extend into high-value manufacturing, giving it a more commercialised economic advantage. The relationship between advanced, high-value and innovative manufacturing is important in demonstrating the value of innovative manufacturing and its influence on advanced and high-value manufacturing, as their development becomes an important agenda for the UK government to make UK manufacturing more globally competitive. From the interviews with expert academics in manufacturing, and with directors and senior managers of UK manufacturing companies, the definition of innovative manufacturing has emerged as 'manufacturing in which the innovation in products and processes is a priority and where there is

continuous investment in research and development to produce new and/or improved products and processes'. Figure 1 shows the relationship between innovative, advanced and high-value manufacturing.

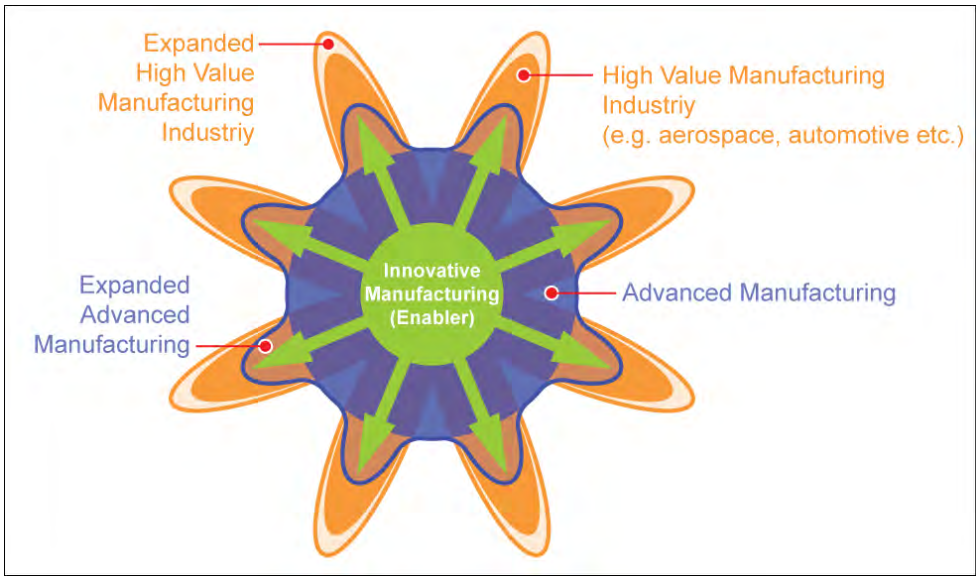

Figure 1. Conceptual manufacturing model of the UK. Innovative manufacturing is the enabler for advanced manufacturing to expand towards high-value manufacturing industries as identified by TSB (2012:16) which include aerospace, automotive, medical, energy etc. This will further encourage the expansion of high-value manufacturing.

Source: Interviews with UK manufacturers and academics in manufacturing, and (TSB, 2012b)

The questionnaire survey indicates that almost all manufacturing companies regard innovative manufacturing as important in giving the company a competitive advantage. The innovative manufacturing companies indicated that creating new market opportunities was the most effective area of innovative manufacturing. In comparison, the non-innovative manufacturing companies indicated that driving the cost of production down was an effective area of innovative manufacturing. Furthermore, the interviews with the manufacturing companies revealed that almost all see innovative manufacturing as their company's most important agenda. The companies' innovation activity focused on product or process development by understanding the users' or clients' needs. This is similar to the second generation innovation process described by Rothwell (1994). However, they were passive in this, especially B2B manufacturing companies, where clients approach with a problem to be solved rather than the manufacturers actively seeking out potential problem areas. There were some indications of manufacturing companies moving towards Rothwell's third and fourth generation innovation process where there was evidence of new market exploration (especially for innovative manufacturing companies from the survey), and collaboration with universities, government organisations (TSB's Knowledge Transfer Partnership (KTP) was most popular among the interviewed companies) and other companies. However, there is still a lack of continuous radical innovation which can be a key to success in a highly competitive market.

DESIGN IN UK MANUFACTURING COMPANIES

The questionnaire survey shows that 40 per cent of innovative manufacturing companies see design as the most important contributor for innovative manufacturing. In comparison, the non-innovative manufacturing companies indicated that research is the most important contributor. Furthermore, the overwhelming majority of manufacturers (87.5 per cent) indicated that design is important or very important for their company. However, the problem lies not in the manufacturing companies' perception of design as important but the company's utilisation of design. Livesey and Moultries (2009) show that the UK manufacturing sector spends 91.7 per cent of its design resources on technical design, using it for technical and engineering aspects of creating products

and services, but only 2.2 per cent is spent on user design, 4.5 per cent on promotional design and 1.5 per cent on identity design. This is further demonstrated by the questionnaire survey results in Figure 2 where most manufacturing companies answered that design is used in the new product development and production stage within the manufacturing value chain by the BIS (2010b).

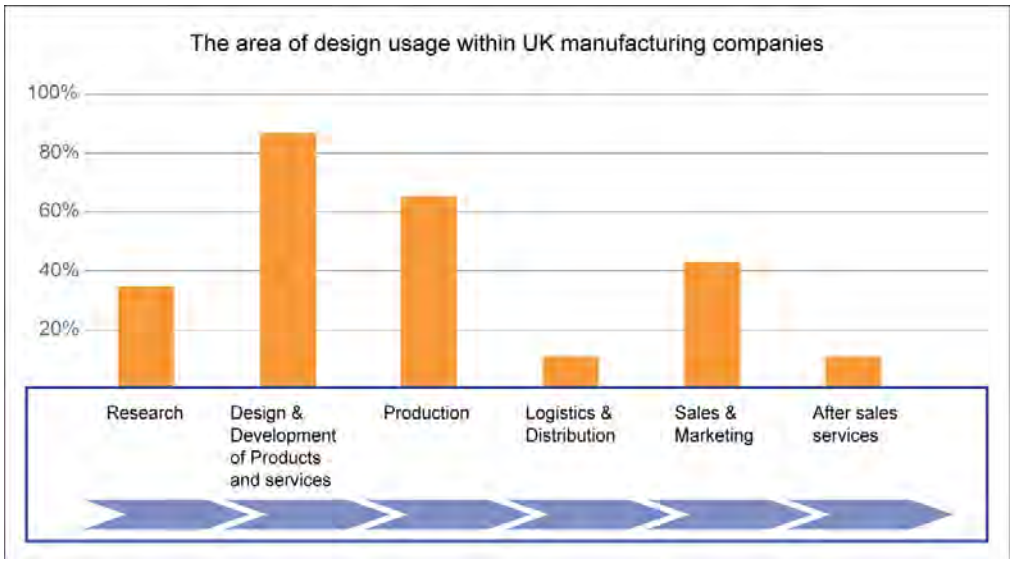

Figure 2. Design usage. The blue box on the x-axis shows the manufacturing value chain created by BIS. In response to the question 'Where is design used in your company?', the majority of design is used in the NPD and production stages of manufacturing along the value chain.

Source: BIS (2010b:6), and questionnaire survey result

The survey also provided the description of design by manufacturing companies where the majority (75 per cent) of the companies indicated that design can be described as 'a process by which information is transformed into a tangible outcome'. However, 37.5 per cent also felt that design is 'a strategic tool for the business', indicating that some companies treat design with more holistic manner across a wider spectrum for their businesses. This is further demonstrated by one company interviewed where the design as a problem-solving process is conducted by the company employees from the production floor to marketing and salespeople. The interviewee commented "basically everyone in the company does something to do with design…". This can be a positive for manufacturers where the company's varied knowledge and experience can be collaborated to create products that is successful in meeting the customer's needs. However, from the interviews, it was found that majority of other manufacturers see design as an operational (technical) part of manufacturing, not a holistic part of overall business. Moreover, for the manufacturers, the innovation was limited to technological improvement of current product and manufacturing (production) process.

DESIGN LED INNOVATION

The survey and interview results indicate that the current predominant use of design in manufacturing takes the form of Design for Manufacturing and Assembly (DFM/A or DFMA), the main purpose of which is to design for ease of manufacture (production) a number of parts which then undergo an assembly process to become a product (Boothroyd, Dewhurst, & Knight, 2002). Furthermore, product design and engineering design are used for New Product Development (NPD), a process for creating a product for the manufacturers. However, design is increasingly recognised as 'adding value', used as a strategic tool for the success of businesses as a whole, not just for technical problem-solving activities. The importance of design in creating value for a product and an enterprise is well-documented and understood, and scholars have observed the importance of the relationship between design and business success (Press & Cooper, 2003; Valtonen, 2007). Design plays a significant role in the development of products and services, because it uses creativity wherever possible to turn ideas into products and service innovations

alongside the innovation process (Bruce & Bessant, 2002). Furthermore, Borja de Mozota (2006) discuss the four powers which explore the influence of design both in developing a physical, tangible product and in the management of a businesses (see Table 1 below). Governments are also now considering the importance of design as a strategic tool to increase their industries' global competitiveness, hoping to gain economic advantages in a highly dynamic market. The Cox report adequately demonstrates this emphasis of design use in industry (Cox, 2005), much of it dealing with design in UK manufacturing industry, where it found that design enhances the impact innovation has on a company. Table 1 shows the scope of design influence within a company as described by Borja de Mozota and Cox.

Table 1 Scope of design influence within a company. Design is expanding its influence further into the businesses.

Borja de Mozota's four powers of design	Cox's design influence for innovation
Design as good business	Reduced unit and labour costs
	Reduced materials and/or energy
Design as transformer	Opening new markets and an increased market share
Design as integrator	Increasing range of goods and services
	Improve production flexibility
Design as differentiator	Improved quality of goods and services
	Increased capacity

Source: Cox, G. (2005) and Borja de Mozota, B. (2006)

Howkins (2001) also describes design as being responsible not only in the consumer facing product or services, but also influencing the whole organisation and manufacturing processes. Verganti (2009) also notes the innovative influence of the expanding role of design, explaining that companies which only use technology-led innovation have limited competitiveness. Companies embracing both technology and design-led innovation can create the unique meaning that separates them from their competitors. The product can thus stay competitive longer and have higher sales volume (Verganti, 2009). If design is only used at operational level as a technical function for production in new product development, as in the case of many UK manufacturing firms, the chance of maximising competitiveness by embracing true innovation potential will be lost. This is further demonstrated by Figure 3 which shows the position of design-driven innovation as research among other innovation phases.

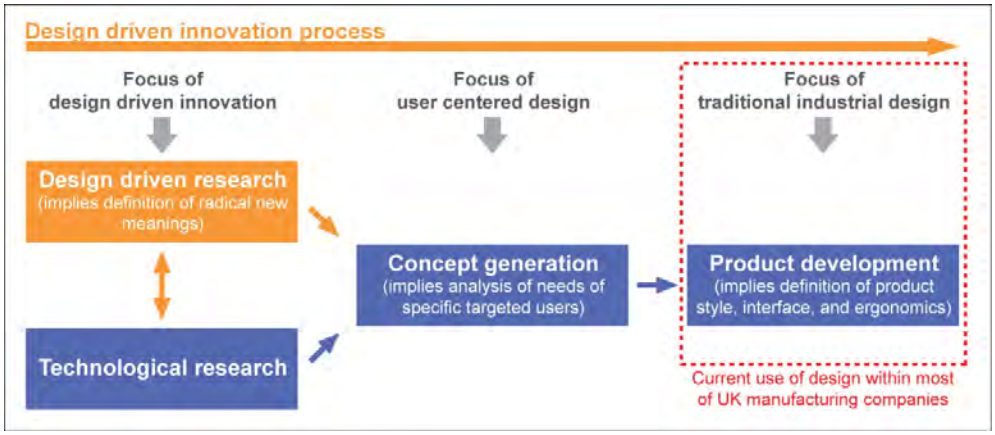

Figure 3. Design-driven innovation as research and the current use of design in the UK manufacturing sector. The red dotted box shows the use of design by most of current UK manufacturing companies, and the blue solid boxes represent the areas where current innovative manufacturing aims to succeed. This shows the current lack of design-driven innovation in UK manufacturing.

Source: Verganti, R.(2009:173), Livesey, F. & Moultrie, J. (2009), and questionnaire survey results.

Furthermore, design can be used as a strategic business tool by adopting design thinking, which Martin (2009) describes as enabling companies to create 'breakthroughs that move the world forward', reflecting Verganiti's expression of creating meaning through design-driven innovation. Its advantage is the delivery of innovation not only in the product or service, but in corporate culture, which encourages creativity and innovation. It is also one of the areas described by the National

Endowment for Science, Technology and the Arts (NESTA, 2008) as hidden innovation which companies should embrace. Brown (2009) also describes design thinking in a more practical sense as creating a harmonious balance between three competing constraints within a company: feasibility, viability and desirability. Design thinking therefore influences both the internal organisation in the management of a firm, and helps create products that can be competitive in the complex, rapidly changing market. Design-driven innovation and design thinking are especially relevant to UK manufacturing, because the research has identified current advantages in technological innovation and capabilities for UK manufacturing on the global stage. By fully utilising design, manufacturing would be better able to survive hostile competition and to thrive in the future. The research found that manufacturing companies are receptive to the importance of design, albeit technical design, providing a good starting point for encouraging them to fully embrace the advantage of design throughout the company.

DESIGN POLICY AND MANUFACTURING

The advantages of embracing design-driven innovation through design thinking can greatly increase competitiveness. Where, then, should it be implemented? The aim of design-driven innovation is to influence the whole company through design thinking. It should have a prominent voice in the decision-making process, and in vision and strategic planning. Examples of successful companies which have embraced design-driven innovation - including Alessi, Fiat and Apple (Veganti 2009), and applied design thinking in their companies such as Procter & Gamble and Nintendo (Wii) (Brown 2009; Martin 2009), have something in common. These companies have all embraced design at the top level of the company, not by chance, as we see ever more examples of successful companies with continuous innovation as Nussbaum (Nussbaum, 2007) described Steve Jobs, former CEO of Apple. However, a CEO with a great interest in and awareness of design is not enough to make the whole company more innovative (Song, Nam, & Chung, 2010). A systematic approach to fully utilising design thinking across the business therefore requires design to be at corporate policy level to increase the chance of success and reduce the risk of irrational decision-making. Although it may sound paradoxical to talk about systems or structures for the discipline of design - which thrives on risk-taking and unpredictability - it makes it easier to understand and implement for the top-level management of manufacturing companies who are unfamiliar with design thinking for business. The difference between design thinking and business thinking is summarised by Liedtka (2010) who argues that managers' over-reliance on business thinking can be an obstacle to achieving innovation for the company. The argument is not about underlining the importance of analytical, rational and objective way of business thinking, but rather it tries to demonstrate the great innovation potential when business managers understand the wider context of design in a company. Therefore a corporate level design policy will encourage expanded utilisation of design from strategic level to operations level of the whole company.

Despite the benefits of corporate level design policy, the current study of design policy is predominantly on a macro (national) level. It involves the government and the entire industry sector to increase national competitiveness and economic growth. The main objective of the national-level design policy is to ensure that appropriate design support is provided (Hytönen and Heikkinen 2003; Amir 2004; Aranaga 2005; SEE n.d.). Support would include a design export programme and design promotion in both industry and education (Choi, Cooper, Lim, & Evans, 2010). Corporate-level design policy is micro-level development in individual companies. Wheelen and Hunger (2002:14) describe a business (corporate-level) policy as 'a broad guideline for decision making that links the formulation of strategy and its implementation.' Corporate-level policy is therefore used by companies to ensure that employees throughout the company make decisions and take actions to support the corporation's mission, objectives and strategies (Wheelen & Hunger, 2002). As with business policy, a corporate-level design policy is part of the standing plan along with procedure and rules linked to single-use planning, such as programmes and budget. Similar to the national level, the corporate-level design policy promotes and encourages design at an

organisation's highest level, so design thinking can be seamlessly adopted by business management, and design at operations level can be an essential part of a company's innovation. The conceptual diagram in Figure 4 shows design policy in a business context.

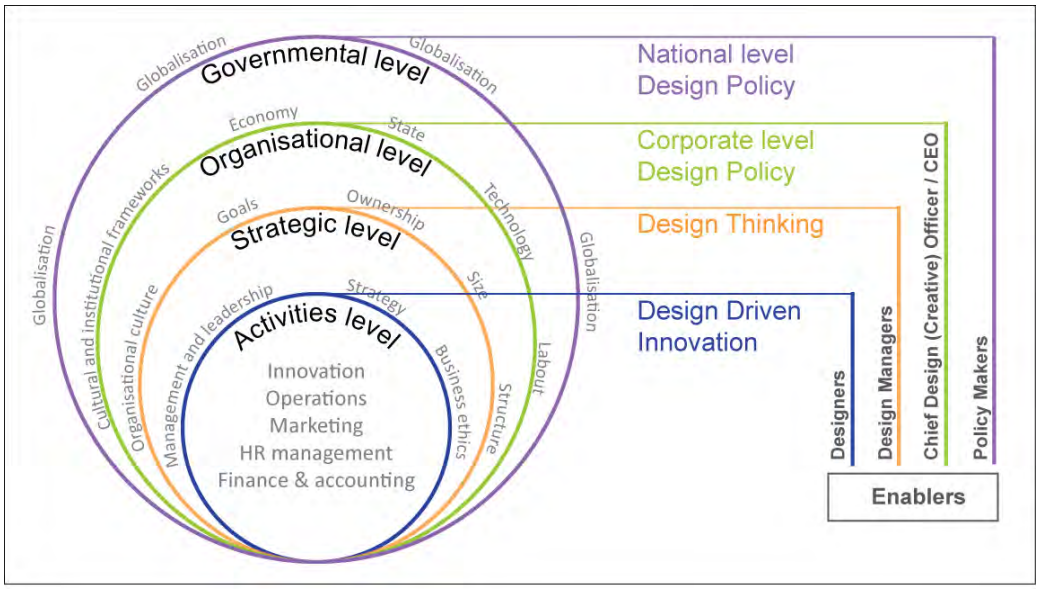

Figure 4. Conceptual diagram of design policy in a business context. The corporate design policy is placed at the organisational level of the business in a context model by Needle (2010:2) which enables design to influence the whole company. This ensures that the company uses design as a strategic tool by utilising design thinking, thus encouraging design-driven innovation.

Source: Needle, D. (2010)

CONCLUSION

To thrive in the increasingly competitive complex global market, UK manufacturing firms need to embrace both technology-led and design-led innovation. Research indicates an active development in technology-driven innovation in the UK, with increased governmental recognition of the importance of manufacturing. The importance of innovation and design as a company's 'function' are well recognised by the manufacturing companies who participated in the survey and interviews. However, the research also found that the utilisation of design is limited to the operational level of businesses as DFMA. As previously described, 'meaning-changing' or 'world-leading' innovation is much more difficult to nurture without the design influences throughout the whole company. Therefore with an appropriate corporate-level design policy, the non-innovative manufacturing firms will embrace the importance of design at operations level, encouraging design-led innovation throughout the company in conjunction with technology-led innovation. For innovative manufacturing firms, who are already more receptive to the value of design, the corporate-level design policy will encourage the use of design thinking as a strategic tool for business management, from corporate strategy formulation through to the operating levels, encouraging continuous innovation for the manufacturing company. These measures will then ensure that UK innovative manufacturing companies sustain their competitive advantage in the complex global market.

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LEADING
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Parkinson, D. and Bohemia, E. (2012). *Developing the Design Storytelling Impact-Approach Framework.*

DEVELOPING THE DESIGN STORYTELLING IMPACT-APPROACH FRAMEWORK

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We propose that designers tell stories, whether this is in the production of artefacts such as sketches, renderings prototypes and multimedia presentations, or verbally when discussing their ideas with one another and their clients. We suggest that when designers work with an organisation at the conceptual stage of a project process, this storytelling can lead to certain impacts on the people in those organisations, such as increasing their capacity to critique design concepts. This in turn has certain ramifications with regard to the organisational strategy. In order to explore relationships between approaches to design storytelling and their impacts on employees of an organisation we developed the 'Design Storytelling Impact-Approach Framework'. Factors incorporated in the framework are identified from relevant bodies of literature and then applied to a case study in order to develop it further. In this case study design teams acted as clients to one another, presenting design concepts as multimedia presentations.

Keywords: Storytelling; Design Process; Organisational Strategy

INTRODUCTION

Storytelling exists throughout all facets of society, with different cultures of people's stories being documented throughout history (Bleyl, 2007). We propose that in modern day, it can be argued that one such culture of people are designers, and that they have their own stories with a unique set of characteristics.

When looking at literature that discusses the constituents of a story, it becomes apparent this applies to design. Bruner (2002) lists the constituents of a story as follows:

- Action directed towards goal
- Order established between events and states
- Sensitivity towards what is canonical in human interaction
- The revealing of a narrator's perspective

When examining design artefacts (such as sketches, renderings, models, prototypes and multimedia presentations) it can be seen how they fulfil this criteria. Table 1 below demonstrates how the criteria for story set out by Bruner (2002) are met by design artefacts.

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Table 1: Storytelling Criteria and Design Artefact.

Storytelling Criteria:	**Design Artefact:**
Action directed towards goal; a story told with a purpose	A design artefact is constructed with the purpose of providing a solution to a design brief
Order established between events and states; state what has occurred and when	If the design artefact is a multimedia presentation, storyboard or report the order of events and states are explicit. If the artefact is a model, rendering or sketch the order of events and states are embedded and will be made explicit when presented by the designer
Sensitivity towards what is canonical in human interaction; demonstrate expected human behaviours in some form	Human interaction with the end product of a project, for which a design artefact contributes to the production of, is of primary concern
The revealing of a narrators perspective; deliver the perspective of the storyteller	A design artefact represents one solution or part of a solution to a design brief, of which there may be many, and therefore is an interpretation of the designer or design team that created it

As well as the presentation of these visual stories, verbal stories exist in the design process in the discourse between designers and clients. Peter Lloyd (2000, p.366) extrapolates story from dialogue in the engineering process, proposing that in this sense 'a story can be interpreted or 'read', different narrative 'viewpoints' might be included, there is a sense of 'closure' in a story, a definite ending, and a 'name' might be invented that references the complex of action'. When looking for these components of verbal stories it can be seen how the discussion of individual concepts within a project and the discussion of a project within its entirety can both constitute a story.

The outcome is that different types of stories are produced at different stages throughout the design process. To illustrate this we mapped in figure 1 below a consumer innovation project along two axis; project timeline and organisational employees and designers involvement in the project. It is based on a typical project that runs between design students at Northumbria University and employees of multinational organisations such as Unilever and Mars. Points 1 to 4 represent instances of design storytelling that meet Bruner's (2002) criteria as discussed above.

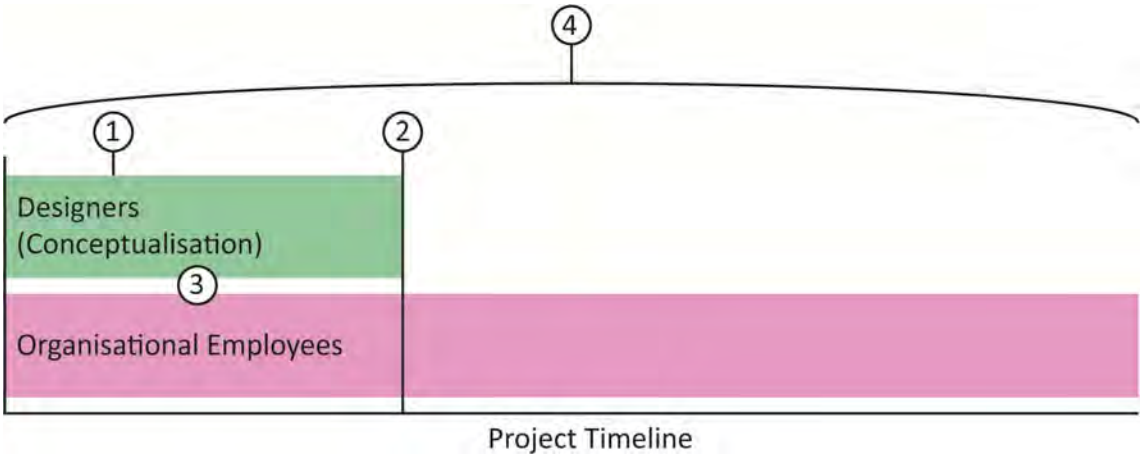

Figure 1: Design Storytelling in the Project Process. Point 1; stories produced by designers in the form of artefacts (sketches, renderings, models, prototypes. Point 2; stories produced by designers when they hand over/pitch finalised design concepts to the clients (multimedia presentations). Point 3; verbal stories told between designers and organisational employees. Point 4; the entire project process viewed as a story.

The storytelling that this research focuses on takes place at point 2, where the designers deliver finalised concepts in the form of multimedia presentations, which are then taken by the organisational employees and developed to the point of production. We will use a recently completed project titled 'Festivals, Fairy-tales and Myths' conducted between 6 universities each located in different countries, as a case study to test the potential of the proposed 'Design Storytelling Impact-Approach Framework'.

AIM

Historically, it has been observed how storytelling influences society, a key example of this being stories told by different religions and how they have been used and interpreted to guide people along the *right* path in life.

More specifically, stories have been examined as a vehicle for critique, resulting in the improvement of something. For example, Bleyl (2007) recounts religious stories, which use the trials and tribulations of central characters, causing the audience to critically reflect on their own behaviours in the hope of imparting moral codes in accordance with religious beliefs. Similarly, Christensen's (2001) writings on organisational strategy build a case suggesting that internal brand storytelling can impact employees in that the resulting personal reflection will aid in the construction of a personal identity in the workplace, influencing the role they play in the organisation. This notion is paralleled by Cross (2006) and Strickfaden and Rodgers (2001) when they describe the narrative inquiry surrounding design artefacts and how this is used to critique the design process in the hopes of obtaining more robust outcomes.

Using this viewpoint, in a situation where designers work with organisations as illustrated in figure 1, it can be argued that the stories told by the designers have the capacity to impact the organisation's employees, more specifically, stimulating critique surrounding individual design concepts and the project process as a whole.

We propose that developing an understanding of the relationship between the approaches to design storytelling and the impacts on the organisation's employees is important. For example, if certain approaches were to lead to a higher degree of critique surrounding a given design concept, this may have implications for the organisations capacity to innovate. The relationship between critique and innovation has long since been established, proposing that in-depth critique is necessary for innovation during the project process (Verdonschot, 2006).

THE APPROACH: LOOKING AT THE LITERATURE

In order to begin developing this understanding fulfilling our aim, relevant bodies of literature were examined abstracting and categorising the relationships between different approaches to storytelling and their potential impacts on clients. The findings are organised in a table entitled the 'Design Storytelling Impact-Approach Framework'. The key aspects of the literature that led to the construction of this framework are highlighted below.

Transformative Learning is a body of literature that explores the role of storytelling in society. It is proposed by writers in this field that storytelling is the foundation of a culture of people's morality (Bleyl, 2007, Turner, 2008). Similarly, Film Theory explores the role of storytelling within society, Lapsley and Westlake (1988) propose that films are worlds organised in terms of a story. Amongst many things, film theorists have a pre-occupation with reality, and how this impacts the interpretation of a film; breathing life into a story. Exploring these bodies of literature in conjunction with literature that relates design process and organisational strategy to story can help deconstruct themes in approaches to storytelling and their relation to impacts on people.

AUDIENCE AS AUTHOR

Firstly, a theme that is important to highlight is the authoring of a story. In relation to the areas of literature highlighted as important, many examples claim that for a story to transform beliefs the author must belong to the audience's community. For example, in the field of Transformational Learning, Hawkins and Georgakopolous (2010) found that using community members to author stories for their community was much more likely to have positive impact than if external people authored those stories. This is paralleled when Ohara and Cherniss (2010) detail an instance where an organisation's employees authored stories, successfully influencing the organisation's culture in a positive way.

ARTISTRY

The power of artistry discussed as a theme in relation to storytelling is also a common theme among the bodies of literature explored. Tufts (1990) describes how filmmakers believe that to move an audience to action, the power of artistry has an important role to play in the story's construction. Artistry is defined here as being skilled in the use of stunning visuals. Both Denning (2007) and Christensen (2001) also propose that artistry in the construction of story can be integral in empowering people, with respect to successful change management and building strong brands.

CHARACTERISATION

Characterisation, or persona building, is another theme across the areas of literature explored. Both designers and organisational strategists talk about using central characters in the delivery of a story in much the same way, suggesting that using central characters whom the audience can relate to will increase the chances of a deeper understanding of the story's message(Madsen and Nielsen, 2010, Denning, 2007). Signes (2010) discusses examples of how traditionally, moral messages are imparted on the audience through using the experiences of central characters in a story, often based on deity, with Greek Mythology representing one of the best examples of this.

FAMILIARITY

Building familiarity in terms of character, environment or scenario, into a story is a theme in approach that links the bodies of literature described here. DeLarge (2004) discusses using familiarity to embed humour into storytelling through inducing the critique of an everyday problem that a design solution has the potential to solve. In Turner's (2008) accounts of transformational theatre production, the environment, characters and language constructed in the play are always familiar to the audience and are seen as key in allowing them to critically reflect on their own behaviours within their community.

IMAGERY

The use of imagery, including metaphor, similitude and analogy, is an approach to storytelling discussed at length within the bodies of literature explored. Strickfaden and Rodgers (2001) detail accounts where metaphor and analogy have been particularly affective in communicating an understanding of design concepts. DeLarge (2004) details an example where the analogy of a board game was used in an organisation that focused on getting employees to critically reflect on the organisations processes. Observing Bleyl's (2007) historical accounts of parables, fables and proverbs, it is apparent that imagery has been a long established approach to storytelling, as it exists as a technique in all cultures and religions he discusses when imparting morality and value systems.

SEMIOTIC LAYERING

A theme in approach to storytelling that links organisational theory to storytelling in society is the appreciation of layering semiotic environments and the quest to understand the impacts of using various layers simultaneously. Saunders (1990) holds the belief that a leader's responsibility is to use more than one medium in delivering information so that it is easily digested by the audience. Denning (2007) has written lengthy discussion on mastering performance spaces and the various combinations of verbal, gestural and visual semiotics, which can aid in delivering a deep understanding to the audience and aid change. The appreciation of technique in layering semiotic environment directly relates to the wider context of film theory. Stam (2002) and Easthope (1993) both discuss approaching the use of visual and verbal semiotics simultaneously and debate the relationship between the two in terms of how they affect interpretation.

TIME BASED

Finally, time based or a sequential focus is highlighted as an important theme in storytelling within the bodies of literature discussed. For example, film theorist Lapsley and Westlake (1988) discusses the careful construction of a block of reality in relation to sequencing events. Signes

(2010) discusses pacing as an important factor in conveying a story, relating timing to meaning construction in the story. This is comparable to Madsen and Nielsen's (2010) sequencing strategy for the creation of a persona scenario as a technique for telling a design story that allows the audience to construct meaning from it.

Based on this literature, the first iteration of the 'Design Storytelling Impact-Approach Framework' we devised is shown Table 2 below.

Table 2: The Design Storytelling Impact-Approach Framework

Impact:	**Approaches:**
Affect Humanity	Audience as Author, Artistry, Characterisation, Imagery, Semiotic Layering
Construct Meaning	Familiarity, Semiotic Layering, Time Based
Inform	Audience as Author, Characterisation, Familiarity, Imagery, Semiotic Layering, Time Based
Question/Critique	Familiarity, Imagery
Synthesise	Imagery, Time Based
Transform	Audience as Author, Artistry, Characterisation, Familiarity, Imagery

A case study that interviewed groups of designers, acting as clients to other teams of students located in other university, about the *story* submitted to them by their partnering team was analysed in relation to this framework, in the hopes of building and developing the understanding of the proposed relationships between approach and impact.

FINDINGS: CASE STUDY

Eighty teams of students from various universities across the world took part in a Global Studio project entitled 'Festivals, Fairy-tales and Myths' (see http://theglobalstudio.eu/). Their brief was to design product/service concepts for a festival native to their partnering team's homeland, acting as both client and designer to one another. After the project had finished, 11 of the teams based at a university located in England were interviewed about their partnering team's *story*; in this instance a multimedia presentation of the final concept. The interviews were semi-structured and took approximately 30 minutes. The interviews began with a viewing of the *story*, acting as a point of discussion centred on the understanding gained of the design concept, changing perceptions of the design concept, critique of the design concept and a reflection on the project in general. The interviews were then transcribed and coded, as this research is exploratory in nature a line-by-line inductive coding strategy was used searching for thematic patterns between approach and impact (Denzin & Lincoln 2011). The relationships highlighted in this section, derived from an initial analysis of the case study, are those which supported the predictions of the 'Design Storytelling Impact-Approach Framework'.

DISCUSSION

Firstly, a relationship that was supported by all interviews was familiarity reinforcing meaning construction and the critique of design concepts. For example, one team had designed a set of boules that glowed in the dark and the story presented about this concept involved them being used during night time with a fireworks display taking place in the backdrop. When discussing how easy it was to grasp an understanding of this concept from the story, the team acting as client proclaimed that the use of a fireworks display was a familiar scenario to all and so viewing the design concept in this context built an understanding about the intended use of the product and the experience it was intended to deliver. It was also suggested that seeing the product in use in this environment stimulated critique surrounding practical design considerations to further develop the concept.

Secondly, a relationship that was supported by all interviews that discussed it was imagery altering perceptions and the critique of design concepts. For example, one team developed a ticketing system for a festival and the story that was presented to showcase this concept involved

the use of fairy-tale characters such as ‘Puss in Boots’ (see figure 2), as they had symbolic relevance to aspects of the ticketing system.

Figure 2: Example of one of the mask for the ‘Puss in Boots’

When discussing this approach, the team acting as client proclaimed that the understanding of the design concept they developed during its development radically altered when viewing its ‘fairy-tale’ presentation. Further to this, they suggested that new lines of questioning had been unearthed that could further develop the design concept along many alternative routes.

Thirdly, a relationship that was supported by all interviews was having the audience as author and the informational value this could have with regards to understanding the design concept. All teams discussed the degree of involvement they had in the design of the concept and how much this impacted them in terms of gaining an understanding of the design concept from viewing the story. With a higher degree of involvement a higher degree of understanding was achieved, with a lower degree of involvement a lower degree of understanding was achieved. In all cases where audience involvement in the construction of the design concept was minimal it was suggested, by the team acting as client, that if the project were to run again this would be rectified.

CONCLUSION

In conclusion of this case study, storytelling that uses familiarity has proved to have positive relationships with constructing meaning and critique of design concepts. Storytelling that uses imagery has proved to have a positive relationship with altering perceptions and critique of design concepts. Finally, storytelling with a higher degree of audience involvement in authoring is positively linked to developing a deeper understanding of the design concept. If the ‘Design Storytelling Impact-Approach Framework’ were constructed from the initial analysis of this case study it would be as follows:

Table 3: Developed Design Storytelling Impact-Approach Framework

Impact:	**Approaches:**
Construct Meaning	Familiarity
Inform	Audience as Author
Question/Critique	Familiarity, Imagery
Changing Perceptions	Imagery

This goes some way to supporting the relationships suggested from the literature review, suggesting that applying a storytelling perspective to this context may have substantial value. It is important to highlight the fact that this case study only examines an instance of the impact of designer's storytelling approach on other designers. To further develop the 'Design Storytelling Impact-Approach Framework' and the theory that underpins it in relation to the specific context of this research study, case studies where designers have worked with organisations will have to be examined in the future.

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LEADING
INNOVATION
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Minvielle, N. and Thieulin, B. (2012). *What do you think of this? How design practices impacts companies' strategies.*

WHAT DO YOU THINK OF THIS? HOW DESIGN PRACTICE SHAPES COMPANIES' STRATEGY

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The academic community has largely addressed the role of prototyping and intermediary objects in product development and innovation. Management studies has examined the performance of conceptual models; psychology has studied the cognitive and planning processes, and sociologists have tried to assess the social factors which affect the creative process.
Compared with these disciplines, the field of strategic management has, to date, rather underestimated the impact of design practice on company strategy and management. Based on a qualitative study of 45 design managers, the authors analysed the role of prototyping in design, not in terms of innovation or product development, but in terms of strategy definition and management. Using the concept of "strategy as practice" as a research tool, we have shown that the way design managers use prototypes and intermediary objects makes a major contributor to company strategy. *Keywords: Mediation objects, Strategy, Discussion*

INTRODUCTION

Although numerous authors have recognized and stressed the critical contribution designers and design practice can make to an organizations' strategic planning, their micro practices have not so far been examined. Among designer's micro practices that are of interest for the researcher are what the literature calls "mediation objects". These objects have been identified as playing a key role in the transformation of companies. Since designers produce, as part of their daily activities numerous types of "mediation objects", it seemed interesting to see how these objects were used beyond their main role in the development process: are they tools of negotiation with the marketing or R&D departments, are they used to push designer's convictions up in the hierarchy etc.

To determine which tools, used in everyday practice, had the greatest impact on this strategy making, we interviewed 45 design managers in 37 companies. The methodology we used allowed us to access all of the development processes of these companies. Of all the tools used by the designers, prototypes and intermediary objects clearly stood out as making the greatest contribution to strategy creation.

Methodology used

Sample analysed: 45 design managers from 37 companies and design agencies operating mainly in France and in diverse sectors (services, industry, B2B etc.). Interviews were held over 9 months, from December 2010 to August 2011.

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Tools: We chose to use a qualitative approach, using the in-depth interview method. This individualized and semi-directive interview focused on the respondent's perception of the the function of design in the organisation. Questions were asked about his role in the orientation, the strategy, design management, the ideation process, the management and evaluation of design resources. All of them closely related to their impact on brand management and experience. Among the questions asked, respondents were asked to explain how they use prototypes and intermediary objects in their everyday lives. They contributed heavily to the research by sending the authors examples of prototypes at the different stages in the development process, detailing the context in which it was used, and the purpose for which it was used.

Collected data analysis: the interviews were based on an interview guide. The data collected was then analysed by thematic content analysis, which consists of dividing the text into units of similar significance. The researchers then analysed the different accounts horizontally and vertically. This inductive method allowed us to understand what the major themes where and hence to codify them. The different themes that came out of the analysis were then interpreted based on specialized literature dealing with the links between design, the organisation, and brand management.

The common understanding of the use of these tools is that they have to be managed efficiently in order to develop innovation, products and services. From this point of view, the results of our interviews show that intermediary objects can also be used to:

- **Generate creative ideas**: here, they fill the gap between the understanding of a problem, and solving it.
- **Help designers validate their proposals**: they help in decision making and evaluating possibilities
- **Visualize proposals**: in order to share them internally and get cohesive approval of the idea.
- **Etc**.

These impacts were analysed in the academic literature, but the way that the design managers we interviewed use them leads us to also suggest that they help designers legitimate their contribution to the companies' strategies:

- They are seen more as **mediating tools** rather **than innovation and product development tools**: since the number of stakeholders having an impact on the designers' activities is fairly important, the design managers interviewed regard these tools as a means of promoting internally strategic decisions and positions. This leads to the following point:

- Intermediary objects are very effective means of **supporting a specific design proposal**. The fact that they are highly visual allows the development of a discussion around their use, potential impact in terms of business etc.

Bearing the two preceding points in mind, designers use multiple tools to promote what they consider to be critical to the company's' strategy: (1) according to their position in the development process, (2) the participants they have to convince, or with whom they will share the idea, (3) the rules, (4) time and space, and finally the (5) cost and time needed to convince the participants.

Based on this analysis, and taking advantage of the Actor Network Theory, as well as the Strategy in Practice one (I), results show that designers use mediation tools strategically, varying them according to the hierarchy level of the participants, their position in the development process etc. (II)litterature review: the mediation object and the strategy as practice

The best way to analyse design projects is to take a process approach that allows to present the mechanism that gave birth to the objects used in this process, but this is not sufficient. Design is more than a simple technical practice, a deeper understanding can only be attained by also examining the social interactions that are at stake. The actor-network theory allows such an analysis, since it takes into account humans and objects in its analysis of the socio-technological network. One of the most interesting aspects of this field of study is that it stresses the role of controversy and compromise in the innovation process. This has led to the development of the concept of the "mediation object" that will be the carrier of such compromises and controversies in the companies.

While bringing controversy, the mediation object also offers grounds and criteria for negotiation: colour, size, usage, cost etc. By facilitating compromise, it allows decisions to be fixed, thereby enabling an idea to go forward in the development process. Jeantet and Vinck (1995) describes these objects as being either modifiable or interpretable, or neither modifiable nor interpretable. We will see later that designers routinely negotiate this controversy/compromise dilemma by changing the mediation objects that they are using and by changing their modifiable/interpretable characteristics.

Added to these characteristics, the nature of these objects has an effect in terms of knowledge transfer, translation and transformation (Carlile, 2004). The fact that they have such an important potential impact, and the way designers use them, leads us to the 'strategy as practice' (SaP) theoretical model. The SaP research corpus stresses the importance of micro practices in the definition of the macro strategy. The figure below presents this framework and highlights the emphasis placed on the process episodes and content routines:

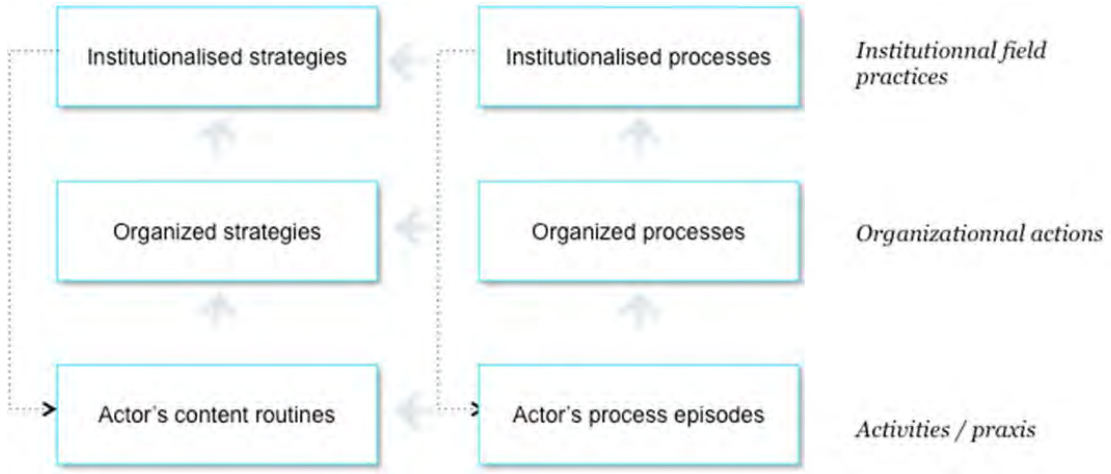

Table 1 The Strategy as Practice framework

More precisely, the SaP model looks at the strategic tools used by the process' participants and their impact on the seven functions of practices / generic activities of strategy making. In this paper, the strategy tool considered will be the mediation objects presented above.

	Strategy routines	Strategy process concepts	Strategy tools	Behavioural norms and routines
Understanding the organization and the environment			✔	
Generating new ideas and initiatives			✔	
Designing as strategy			✔	
Communicating a strategic direction			✔	
Making strategic decisions at any level of management			✔	
Agreeing about means of implementation			✔	
Control and adjustment			✔	

Table 2 A focus on the strategy tools

DIFFERENT OBJECTS AND DIVERSE MICRO PRACTICES FOR DIFFERENT STRATEGIES

THE TRADITIONNAL VISION OF MEDIATION OBJECTS

Traditionally, mediation objects in design, such as drawings or modelling are seen as product development tools. They are used in order to help different teams work around a product and put it on the market. A classic vision of this is represented in Figure 1: the designers start the new product development process by making a drawing that will help validate the basic idea. They then model, animate and prototype this drawing before putting it on the market. This process is interesting in the way that it facilitates the transition from the “idea generation” phase to the selection and development one.

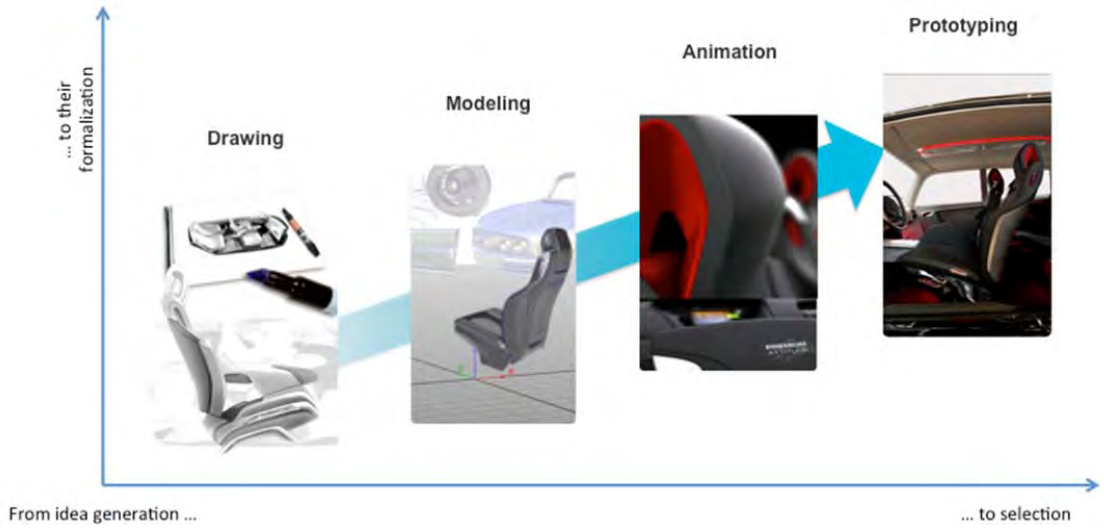

Figure 1 The traditional vision of mediation objects as tools for product development.
Source: Interview with N. Pegorier, Faurecia (2011)

Nevertheless, when looking deeper at how designers really use the mediation objects, one realizes that it is not as linear and simple as it looks. The kind of mediation objects used can vary greatly depending on; the company, whether design is outsourced or not, the hierarchy among the people around the table etc.

DIFFERENT MEDIATION OBJECTS FOR THE SAME DEVELOPMENT PHASE

The first insight drawn for the interviews is that there is no single rule for the types of objects that can be used at each development phase. For example, when designers have to present their idea for the first time to a client (internal or external), the range of levels of rendering used is fairly wide, as shown in the figure 2.

Figure 2 Two different renderings for the same phase: first rendering to client. Manitou (left) air Airbus Corporate Jet Center (right)
Source: Interview (2011)

In the Manitou case, the designer made a fairly detailed rendering, and chose the colours and angle of view in order to give a feeling of aggressiveness. In the Airbus Corporate Jet Center case, the first rendering was made in the presence of the client and is hand drawn. This difference is extremely important in the sense that is not due to technical or product development reasons. In the Manitou case, the design manager had to "sell internally" to the marketing department. In the Airbus case, the designer had to "sell" to an external client. To ensure that he has included everything expected by the client, the designer first draws a "rough impression"(a rough sketch?) of his clients' requirements and has him validate them before going on to a more precise stage. For Manitou, the designer had to make the proposed truck look good enough to appeal to the marketing team. Hence the slick high quality rendering.

These changes can be seen later in the development process: While Manitou goes back to render more technical details, having validated the overall design, Airbus still has to validate the final rendering*.

* This process is made easier by the fact that Airbus generate the rendering in what is called a 'Digital Mockup' which gives a 100% representation of the plane's technical details.

Figure 3 Two different levels of rendering at the same phase in the development process: Manitou (left) air Airbus Corporate Jet Center (right)
Source: Interview (2011)

The following figures present these differences in terms of tools and their use in the process. We see that the production path of mediation objects in the two companies is quite different:

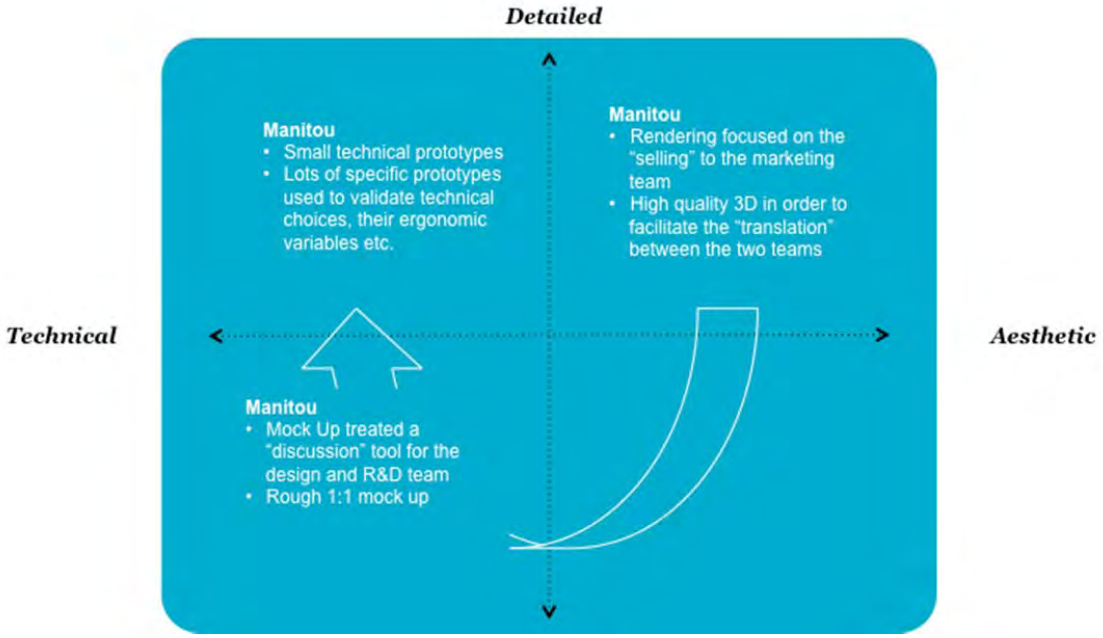

Figure 4: Production path of the mediation objects at Manitou
Source: Interview (2011)

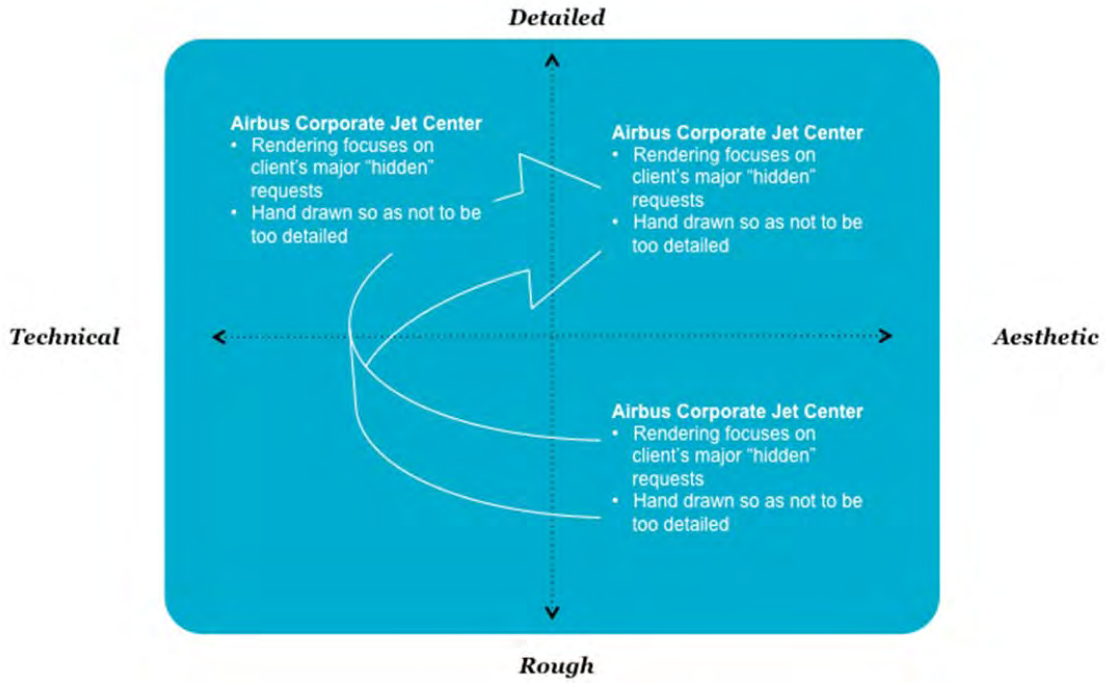

Figure 5: Production path of the mediation objects at Airbus Corporate Jet Center
Source: Interview (2011)

These differences can be appreciated by looking at the pictures of the objects produced:

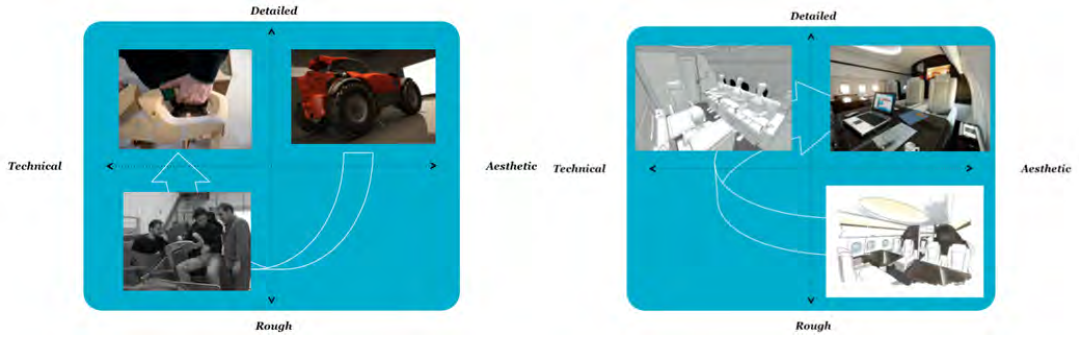

Figure 5: Pictures of the different mediation objects products at Manitou (Left) and Airbus Corporate Jet Center (right)
Source: Interview (2011)

What we understand from this initial analysis is that where there is a difference in mediation objects between companies at the same phase of the development process, this difference is mainly due to the difference types of clients that designers are interacting with.

DIFFERENT MEDIATION OBJECTS DEPENDING UPON THE CLIENTS WHO HAVE TO BE CONVINCED

When looking at the design processes of the companies interviewed, one point quickly became clear: when it comes to getting their projects finally approved, designers are quick to identify the factors which carry real weight in the final decision-making process. One of these factors is the type of person that they are 'pitching to'. This is particularly true in the process of some interviewed companies. In the one presented in the figure 4, we see that the final validation is made by the CEO himself, and just three weeks before launching production. Needless to say, the designers are extremely concerned that their projects be accepted…

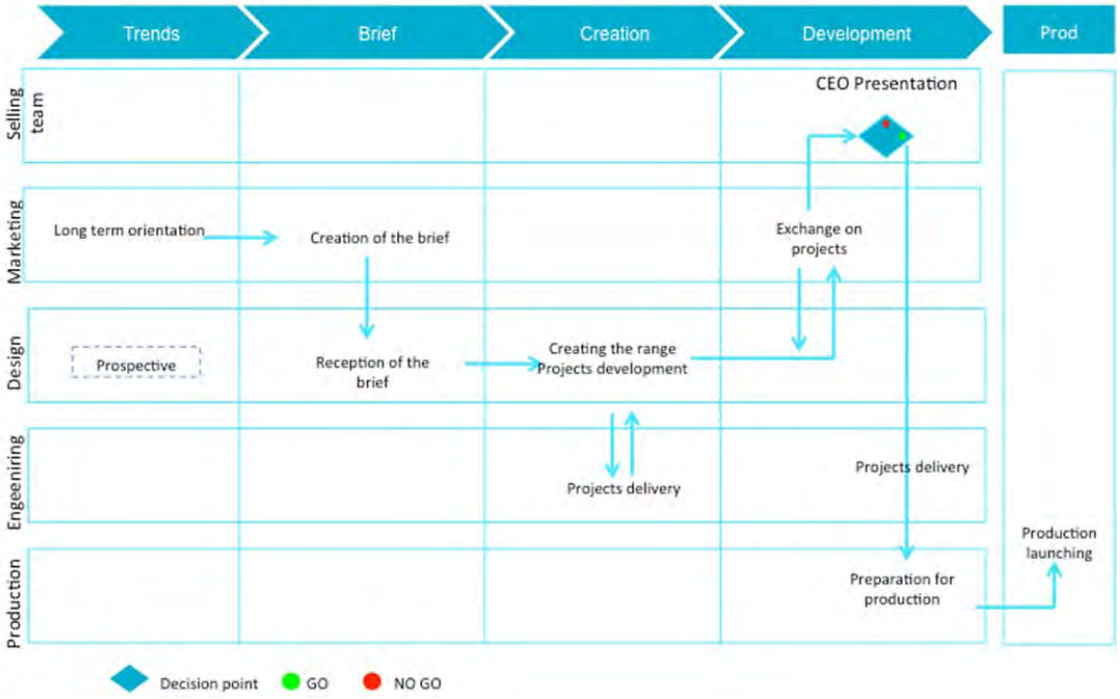

Figure 6: Design development process of one of the companies interviewed.
Source: Interview (2011)

This leads to designers to set up small commercial events and to use storytelling tools to promote their products in this “internal market”. At this point, all technical aspects of the product are set aside, and only the glossy effect of the design seems matter. In one of the companies interviewed, it goes even further because the final validation if made by the sales team, which has to guaranteed the 'sell in' and 'sell out'. Because of the difference in language and perception between the design team and the commercial team, designers create a 'spectacle' in order to present their latest collections. Most of the objects presented at this point are not required in the development process, but are just here to ensure that the final product will be accepted. As shown in the figure below, instead of just using “white prototypes” to validate a packaging design project the, designers will spend hours developing colours and a whole retail setting, even when it is not absolutely necessary.

Figure 7: Creating a sales atmosphere when presenting the designs for validation

Source: Interview (2011)

In this very specific case, but also in many of the other companies interviewed, this has an impact on the designer's workload. Because they spent such a long time developing an adequate mediation object, they tend to arbitrate and choose the ones that will have the greatest impact on the product development's participants, and not necessarily the one they believe in the most. For example, in the company we interviewed which has a "final presentation to CEO" validation system, the difference between turnover and time spent on each range clearly shows designers spend more time rendering the blue range products than the others. The reason being that this collection is the CEO's favourite one.

Figure 8: Difference between turnover and workload per collection
Source: Interview (2011)

In order to avoid spending too much time on some mediation objects, whose only function is to sell a project internally, some design managers have sought a way to "enrich" their objects in order to push them through the hierarchy. For the Chief Creative Officer of Orange, one of the ways to do this is to present an object which is not too precise, but which has been co-created with a customer. The idea behind this strategy is that it is much more difficult for a marketing person to reject a project that has been developed with a customer. What we see here is that designers are adapting the type of objects that they produce during the development process to suit the people they are appealing to.

DIFFERENT MEDIATION OBJECTS DEPENDING ON THE DEVELOPMENT RULES AND TIME-SPACE SITUATIONS

Company rules and time-space situations also offer designers interesting opportunities to produce controversy and compromise. Company rules, determine the choice of mediation objects to be produced. This determination is based on the dichotomy between implicit and explicit rules. In the case of time-space, the determination is based on the dichotomy between loose and fixed rules. If we can find the same objects in different situations, and their roles can be quite varied. A 3D rendering can be a vector of controversy when it is shown in an implicit and loose situation, such as during lunch, whereas the same 3D will be a vector of compromise when shown in an explicit and fixed situation such as a project review where a 'Go/No Go' decision is expected. Figure 7 shows how these different situations can be mapped.

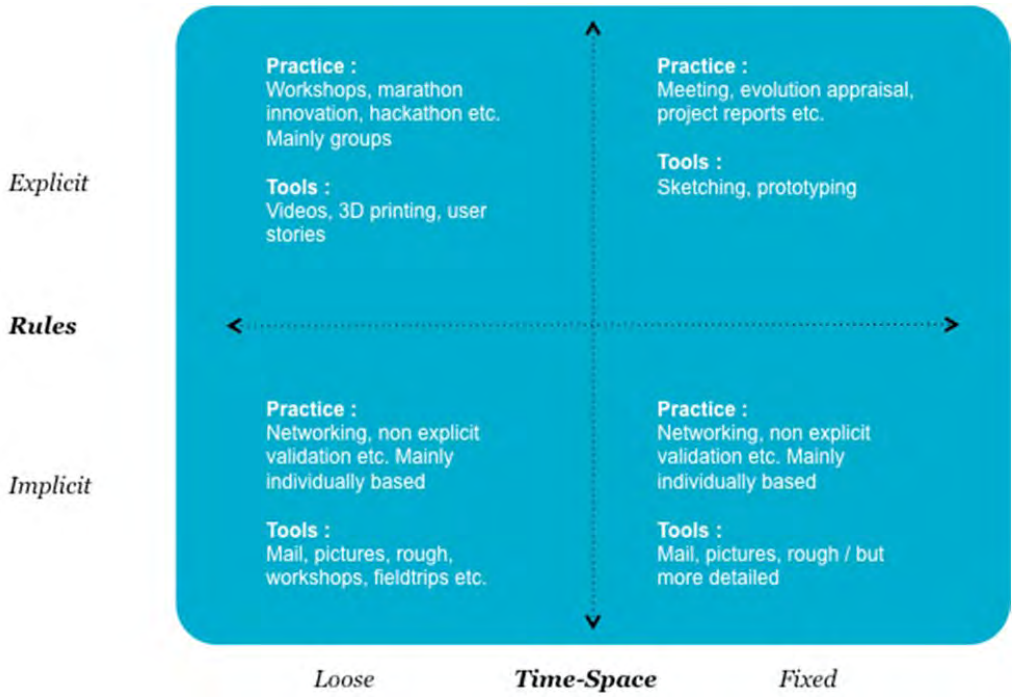

Figure 9: Rules and time-space impact on the kind of mediation tools used
Source: authors (2011)

The explicit rules case is the most common, with designers producing objects that are sometimes controversial, but mainly compromise. This represents a major difference when compared with the non-explicit case where the purpose of the object is mainly controversial. When describing this function, expressions like “allowing one to start a discussion” were used by most of the design managers interviewed.

When in an explicit situation and fixed time-space setting, designers tend use objects which are quite finalized and which take into account the different points of view of the participants they face. In the example shown in figure 10, the cabin layout is a finalized example. Although there are three alternative potential layouts, each one still maintains the same design and technical constraints, thereby making changes difficult. In the loose time-space setting, the designers of the Casino retail group produced “playing cards” that were co-created with the R&D team. This allowed to transform them in allies, as the cards represented of the company’s real technological knowhow. The discussion that will the happen during the workshops will then be based on something that is accepted by all the participants in this particular workshop.

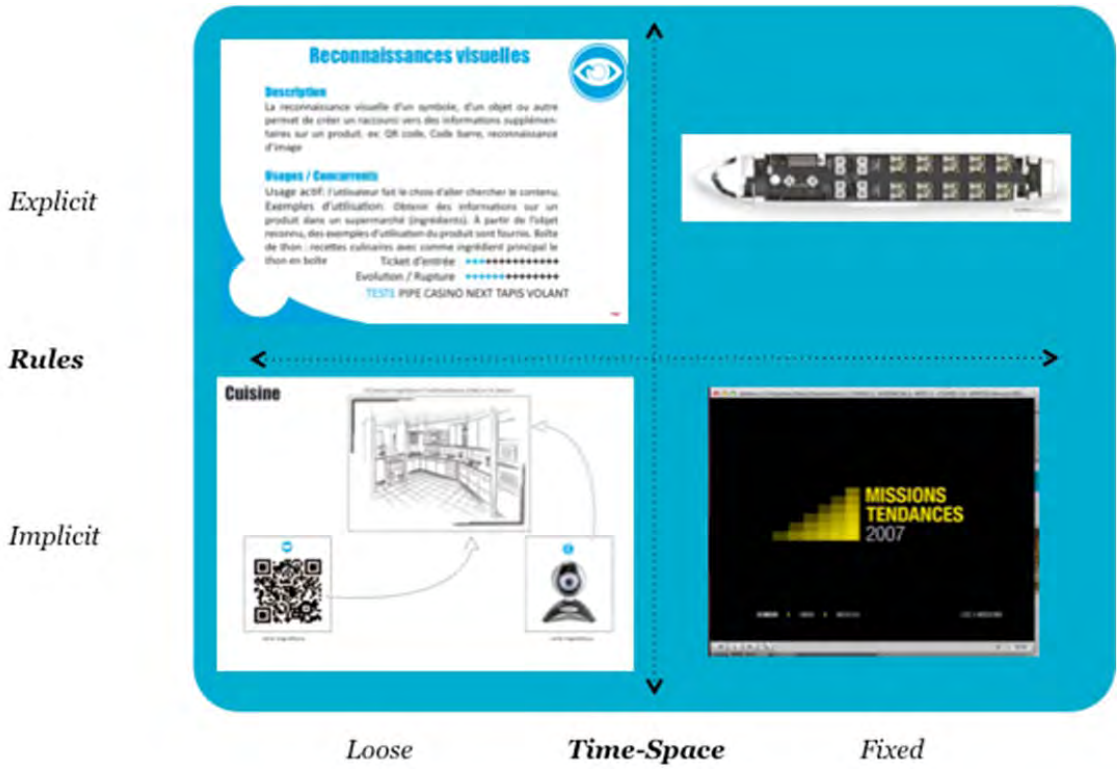

Figure 10: Rules and time-space impact on the kind of mediation tools used: examples
Source: authors (2011)

The implicit rules situation is also an interesting example of how designers try to convince people in the organisation of their vision. A good example of this is the "missions tendances" that Renault's design department has set up. Once a year, designers are sent to another country for a week or two, to find out what the key drivers of automobile consumption are. During their stay they make a video report of their findings. This video is copied a few hundreds times and sent to their most important colleagues. By doing this, they hope to promote their ideas and recommendations inside the company, but in a way that does not feel threatening to the marketing and R&D departments. This is a very good example of how an intermediary object can generate controversy and debate in a company on a fixed time-space.

Using the loose time-space, some designers interviewed created specific situations and interactions in which they could use intermediary objects for a particular purpose. For example the design team of the Casino retail chain in France often invite their colleagues from Marketing or Logistics to their own workshop presentations. This helps to break down barriers raised in the normal process, and allows them to put forward subjects for discussion which they feel are important to the Group. The picture shows an example of the mediation objects that they used for discussion: by placing the marketing team in 'the consumers' kitchen', they encourage a wider discussion, steering the teams away from a purely retail based strategy towards one inspired by the notion of a global consumer experience. Another example can be found in figure 4, where the companys' design team produced a range of objects during the creation phase that were then sent directly to the R&D team without the knowledge of the marketing team. This allowed them to then present solutions to the marketing team that were already proven to be technically feasible. They could then rebut marketing department arguments that the product could not be produced by the current technology. Once again, the mediation objects are used strategically, in a sociological way rather than a purely technical way.

CONCLUSION

The purpose of this paper was to try to give a deeper understanding of how design managers use mediation tools and how this practice impacts on the overall company strategy. Contrary to common belief, these objects are mainly used on a sociological basis, rather than a purely technological one. This will vary in accordance with; the process constraints, the hierarchical level of the interlocutors, the rules and time-space setting, the stage in the development process etc.

In order to understand the real impact of this implicit practice on companies these findings need to be further examined, how do the other participants feel about this practice? what precisely gives rise to the development of a particular object? As we would expect, the nature of the client, whether they are internal or external, appears to have a great bearing on way objects are produced.

COMPANIES INTERVIEWED

Company name	**Respondent**	**Industry**
Airbus Corporate Jet Center	Sylvain Mariat	VIP planes
Alstom	Xavier Allard	Transport
Amer Sports	Philippe Besnard	Sport
Arthur Bonnet	Marc Moreau	Kitchens
Balsamic	Giacomo Peldi Guilizzoni	Interface design
Bayer Materials Science	Ralph Schneider	Materials specialist
Bel'm	Anthony Durand	Door
Cidetoys	François Marcelin	Games
Cordescourant	Thomas Buisson	Ropes
Dorel	Yann Naslain	Baby products
EDF	Gilles Rougon	Energy
Erard	Patrick Bonnemere	Audio and video
Fabrica	Sam Baron	Benetton's external design team
Faurecia	Nicolas Pegorier	Automotive
Fiskars	Emmanuel Rado	Tools
Groupe Accor	Michel Gicquel	Hospitality
Groupe Casino	Aurélie Ladeuix Thibault de Pompery	Retailer
Groupe Seb	Stéphane Thirouin	Home appliances
Hager Security	Jean-Yves Bournique	Alarms and security
IKEA	Jean-Yves Massé	Home interior products
Impex	Marine Sibellas	Automotive
Irisbus Iveco	Thierry Sauvaget	Transport
Legrand	Pierre-Yves Panis	Electrical products and systems
Manitou	Thierry Lehmann	Heavy work tools
Maped	Daniel Racamier	School furniture

Mastrad	Elodie Brisset	Kitchen furniture
Mc Donald's	Eric Bourgeois	Food
Orange	Clément Bataille	Phone operator
Oxylane	Arnauld Blanck	Sport retailer
Oxylane – Artengo	Simon Hadjidimoff	Sport retailer
Oxo	Alex Lee	Kitchen tools
Philips	Jean-Marie Bourel	Lighting, electronic and medical appliances
Porsche Design Studio	Roland Heiler	Automotive and else
Quick	Quick	Food
Renault LQC	Patrick le Quément	Transport
Saunier-Duval	Vincent Picasso	Heating
TCL	Gérard Vergneau	Electronic

AGENCIES INTERVIEWED

Agency name	**Respondent**	**Industry**
Dici design	Thiphaine Igigabel	Design agency
Graphic Identité	Tomas Ahrens	Design agency
Kiska Design	Gerald Kiska	Design agency
MBD Design	Vincent Créance	Design agency
Logic Design	Jérôme Lanoy	Design agency
Moswo	Arno Lebrunet	Design agency
User Studio	Matthew Marino	Design agency

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SKIP THE SILVER BULLET: DRIVING INNOVATION THROUGH SMALL BETS AND DIVERSE PRACTICES

Benjamin GROSSMAN-KAHN* and Ryan ROSENSWEIG

Nordstrom Innovation Lab

Leaders who look to design-led innovation as a 'silver bullet' find their organizations frustrated when new initiatives do not immediately lead to groundbreaking results. This emphasis on swiftly transforming a culture through a single approach conflicts with the multidisciplinary nature of innovation and undermines the sustainability and growth potential of innovation efforts (Walters, 2011). As large and long-established corporations race to remain relevant to consumers and markets amidst a rapidly evolving consumer economy, we have witnessed a growing tension between creating nimble, innovation-driven cultures at scale without disrupting the existing culture and practices that are unique to each company (Baregheh, Rowley, & Sambrook, 2009). The tension is magnified when companies attempt to adopt new innovation methodologies without deep understanding of the underlying principles or a willingness to endure the unpredictability of the creative process.

Keywords:The Lean Startup; agile; design thinking

INTRODUCTION

The history of corporate America is marked by a series of process innovations that created category leaders or entirely new industries. From the production line of Henry Ford to the Lean manufacturing principles of Toyota, company leaders are always on the lookout for 'the new thing' that will differentiate them from the competition. Design-led methodologies for innovation have become popular because they support what today's executives believe to be a key leadership skill: creativity (IBM, 2012). Organizations that have traditionally lacked cultures of design now embrace it as a means to competitive advantage, as seen in the proliferation of articles, publications and workshops celebrating design thinking as the key to developing creative confidence within innovation teams (Walters, 2011). Success stories such as Intuit (Martin, 2011) and P&G (Lafley & Charan, 2008), whom have both built successful innovation cultures using design thinking, offer tantalizing and inspiring results.

The increasing industry dialogue around the importance of building cultures of innovation within large organizations has been plagued, however, by misconceptions that design thinking is a process that can be 'hacked' or easily merged with existing work processes and metrics of success. Other organizations have struggled when innovation methodologies are taught (and implemented) as rigid and linear processes that teams must follow (Walters, 2011). Many of these companies fail to adopt two factors critical to success: a willingness to embrace the inherent risks and learning curve that accompany long term innovation efforts and a system to track growth and results based on "Innovation Metrics" (Ries, 2011). As a result, companies subsequently struggle

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to expand innovation capacity beyond the original ‘skunkworks’ teams (Lockheed Martin, 1943). This article will reveal the process and tools used by the Nordstrom Innovation Lab, and will share lessons learned from building an innovation capability from the ground up. We will also propose a multidisciplinary approach to building innovation capacity through the integration of diverse innovation methodologies.

HOW MIGHT WE BE MORE INNOVATIVE?

The fashion specialty retailer Nordstrom is best known for its focus on the needs of the customers and ability to translate the fashion trends of early adopters into the lives of a more conservative audience of social influencers. Considered unique among major retailers for maintaining its headquarters and creative center in the Pacific Northwest rather than in fashion’s coastal capitals of Los Angeles and New York City, Nordstrom’s success has largely been based on strategic, thoughtful expansion and a brand defined by its commitment to offering the highest possible value to its customers across all channels.

As new generations of customers seek experiences defined by brands both in store and online, Nordstrom has leapt into creating an multichannel service experience. Through its website, social media presence, mobile shopping experiences, and more interactive in-store touch points, Nordstrom has responded to the growing demand for mobile, interactive retail experiences with the goal of serving the customer no matter how they choose to shop.

BE FAST AND FASCINATING

In 2010, faced with the challenge of rapidly changing relationships between retailers and their customers, the Nordstrom executive team focused their annual off-site retreat on innovation. The retreat included the full executive team including CEO Blake Nordstrom, the heads of stores, and CIO Mike Richardson. At the retreat, it was decided that in order to support existing assets and develop future competitive advantages, Nordstrom had to make a major investment in innovation. As a result of the conversations and decisions from the retreat, an innovation committee was formed and given a substantial budget to invest in innovation projects. Among other investments, CIO Mike Richardson was charged with identifying a leader for a skunkworks project focused on innovation with a simple mission: “be fast and fascinating” (Brown, 2012).

In January of 2011, Mr. Richardson tapped one of Nordstrom’s most passionate young professionals, five-year Nordstrom IT veteran JB Brown. Mr. Brown was a passionate advocate for agile software development and lean manufacturing principles, and well respected among his peers as a mentor and mentee. The initial concept for the skunkworks project was an innovation lab to test new technologies and imagine how they would support Nordstrom’s businesses. With this mandate in hand, Brown quickly assembled a team. As he recalls, “we took a note that said ‘Innovation Lab’ and put it on one of our conference rooms, and that was our first space” (Brown, 2012). Brown’s first two hires were a visual designer and an agile coach who together with Mr. Brown crafted a unique process inspired by Agile and Lean manufacturing principles that challenged the team to move quickly in generating ideas, building and testing them.

INNOVATION 1.0 - BE NIMBLE AND LEAN

The Innovation Lab began as a two-person team with a conference room as an office. Building on his momentum within IT teams, Mr. Brown began developing a culture and great practices for the lab derived from Agile software development and Lean manufacturing methods. Over the last two decades, traditional methods of project management (Royce, 1970) for the strategic organization of technology teams have been challenged. Instead of large teams being organized into industrial functions, similar to an assembly line, technology teams have tried to become more nimble, by breaking large tasks into smaller sprints—projects that each last between one and six weeks (Larman, 2004). Each sprint focuses on a few prioritized features and ends with a working system as a deliverable. Teams are encouraged to build both incrementally and iteratively--providing

frequent opportunities to include users for feedback, assess a solutions' suitability, and reflect on what works and what did not (Gilb, 2007). Agile teams are guided primarily through client-driven priorities: requirements that the client perceives as having the highest business value are prioritized in the first sprint, the remaining features are assessed and prioritized for future sprints.

Contemporary methods that have influence and sprung from Agile software development include Dynamic Systems Development Method (Stapleton, 1997), eXtreme Programming (Beck K. , 1999), Adaptive Software Development (Highsmith, 2000), Scrum (Schwaber & Beedle, 2002), Crystal (Cockburn, 2002), and Feature-Driven Development (Palmer & Felsing, 2002). Linking these methods are a set of common principles and beliefs that are articulated through the Agile Manifesto, a codified document that serves as the philosophical soul of the Agile movement. As Agile adoption has grown amongst larger IT organizations, one of the emerging critiques has been that the process of agile has been institutionalized to the point of losing sight of these founding philosophies (Mashford, 2005).

Table 1 The Agile Manifesto
Source: Beck, et al. (2001)

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:
• **Individuals and interactions** over processes and tools • **Working software** over comprehensive documentation • **Customer collaboration** over contract negotiation • **Responding to change** over following a plan
That is, while there is value in the items on the right, we value the items on the left more.

Aware of these critiques and inspired by the Agile Manifesto (table 1), Brown and team made the decision to embrace the mindsets and philosophical soul of agile through key practices embedded within the lab. Rather than simply building an agile development team, Mr. Brown envisioned a 'Post-Agile' mindset (table 2) with a team that valued community, user input, and a bias towards action (Brown, 2012).

Table 2. Key Components of Nordstrom Innovation Lab's 'Post-Agile' Process
Source: Brown, J. B. (2012)

Pairing	Team members create collaboratively to facilitate knowledge transfers across the team
Stand-up	Every morning, team begins together with a facilitated review of work-in progress, work completed, and work that needs to be completed
Retrospective	Every week, team gathers to reflect on the week and discuss improvements that can be made to their process
Bias towards action	Time spent debating is considered time wasted, team members are empowered to prototype and build at low fidelities to seek answers
Customer-centered prioritization	Tasks needing to be completed are prioritized based on customer and stakeholder needs.

Through the integration of the philosophical soul of the Agile Movement, it's Manifesto, and Brown's belief in a 'Post-Agile' mindset, the Nordstrom Innovation Lab was ready to act differently

and more quickly than traditional IT teams. Instead of being hindered by 'waterfall' techniques of software development (Royce, 1970), the Innovation Lab had its sights set on success through small iterative and incremental bets leading to significant opportunities.

FIRST LESSON OF FAILURE

With a process and a team formed, the newly named Nordstrom Innovation Lab was commissioned to influence the organization through insights into potential uses for new technologies as well as act as a vehicle to evangelize the benefits of an agile development process to the larger IT organization. The lab's first approach to innovation (figure 1) leveraged agile development methodologies as well as methods derived from Toyota's Lean Manufacturing to move quickly and eliminate waste in order to advance prototypes through multiple iterations. These early experiments looked at technologies ranging from social media to open source hardware and software.

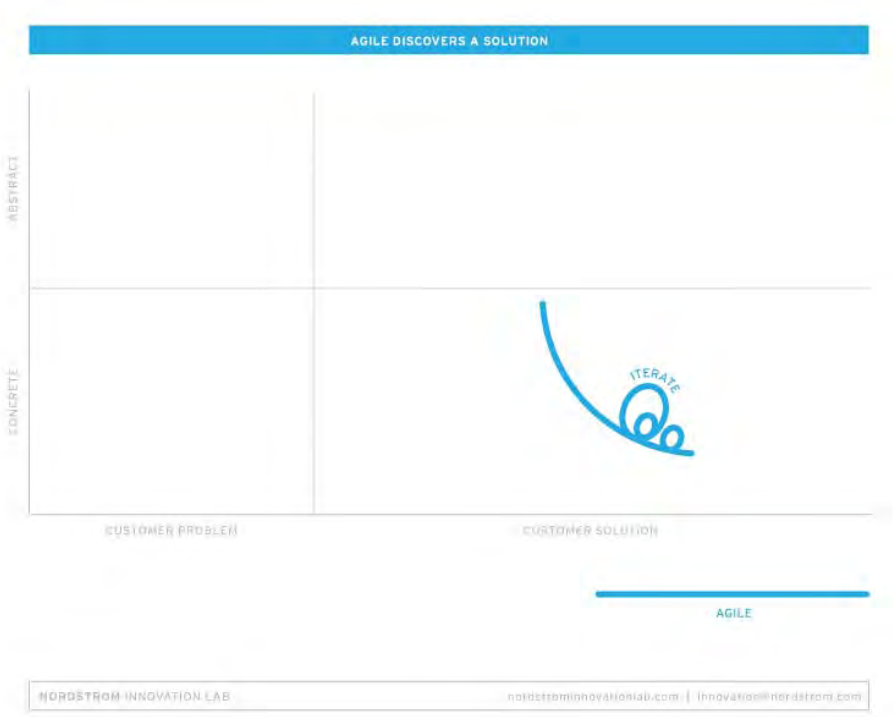

Figure 1. Agile Discovers a Solution
Source: Brown, J.B., Grigoriu, M, & Lightsmith, J. (2012)

What initially seemed like a great idea failed to gain traction. The ideas that were developed in the lab, isolated from the rest of the organization, were provocative, but not connected to the interests of business leaders. The teams in the greater organization were already over-committed to solving more immediate problems, and their leaders did not want to risk introducing anything outside of already planned initiatives. An intensive retrospective, including a "root cause analysis" (Andersen & Fagerhaug, 2000), was performed and the lab members concluded that, as an experimental technology laboratory, they were providing a service that the company di not need. Instead, using the agility and nimbleness afforded by the lab process, Brown and his team proposed an evolution into a discovery vehicle that could rapidly test and experiment ideas generated from other business executives and leaders (Dyer, Gregersen, & Christensen, 2011).

RETROSPECTIVE:

PUSH AND DELIVER VS. PULL AND DISCOVER

One of the early challenges the Innovation Lab encountered was a resistance from business units to the ideas generated. While the ideas were creative and explored commercial potential for

emerging technologies, they were not grounded in customer centric problems or perspectives. Compounding the issue, business leads were highly skeptical of accepting such new and invalidated ideas into their book of work for the year. This lack of enthusiasm is predicted by multiple studies on creativity, including "Bias against Creativity" which discovered that uncertainty often creates a negative bias towards creative ideas (Mueller, Melwani, & Goncalo, 2012). Furthermore, this bias was shown to extend to the point that it became difficult for outside observers to recognize a creative idea altogether. In the case of the Innovation Lab, when ideas were pushed to external teams Brown and team discovered that they not only lacked enthusiasm for the wild ideas generated but also had already full books of work. In talking with executive sponsors of the lab, it became clear that there needed to be more of a co-creation model in which external business teams were directly involved in the lab development process. Inspired by the Innovator's DNA, which lays out a case for the importance of discovery skills in the innovation process, the lab sponsors suggested a new model in which the lab could apply its skills towards helping the company and teams rapidly generate discoveries which might lead to innovation opportunities (Dyer, Gregersen, & Christensen, 2011).

INNOVATION LAB 2.0

As the Innovation Lab moved from its original model towards a co-creation based discovery role, the team approached stakeholders within Nordstrom to understand where challenges existed that might offer opportunities for innovation, and how the lab team could use its process towards these problems. By engaging external sponsors as stakeholders in the work, the hope was that these business leaders would be more willing and able to accept hand-offs based on the lab's discovery efforts.

Table 3 The Nordstrom Innovation Lab's Response to Organizational Challenges

Challenge	Action
1. A lack of awareness of the lab within the company and failure to connect to innovative ideas and individuals within the wider organization	• Lab tours open to the company that explained the lab tools and process • An internal website and newsletter that shared lab updates and allowed all employees to share innovative ideas into an innovation pipeline.
2. A failure of the lab to tap into existing institutional knowledge around projects	• A Pre-engagement phase in which stakeholders and the lab discuss the innovation process and agree to goals, deliverables, and discuss hand-off procedures. • This phase also allowed project sponsors to share existing internal knowledge around a problem space to minimize duplication of efforts
3. The need to show validation of the discoveries and learnings from lab projects that were	• The Lean Startup Build-Measure-Learn Cycle

convincing to the business owners	

Through these conversations, the lab uncovered three roadblocks that acted to impede progress and acceptance from the rest of the organization, and took action to address these challenges, as seen in table 3.

In the case of challenges (1) and (2), the lab was able to brainstorm and solve them internally by applying their process and holding conversations with a few key individuals. However, it was clear that in order to fully deliver validated concepts and learnings the lab would have to expand its process capabilities. Agile and Lean Manufacturing were dependable for building quickly but lacked tools or guiding metrics to help the lab determine not only what to build, but validate ideas before turning them over to the business. The time had come to expand beyond agile and lean methodologies, and the lab turned its attention to discovering other methods for showing validation of discoveries to Nordstrom business owners.

THE LEAN STARTUP

With the explosion in web startups over the past five years has come a parallel growth in books, manifestos and practices that proclaim to offer competitive advantages to startup founders. Ranging from the Business Canvas model (Osterwalder & Pigneur, 2010) to Agile software development and eXtreme Programming, these new approaches are part of a larger entrepreneurial diaspora from the traditional business practices of the 20th century to a faster and more nimble approach to building a business.

While searching for new tools, several lab members mentioned a concept they had been reading about on StartupLessonsLearned.com, the blog for entrepreneur and thought leader Eric Ries (2010). Mr. Ries was assembling an emerging concept called The Lean Startup, which was based on his own lessons learned as founder of IMVU, a web based startup. Mr. Ries' theories were rooted in the customer development approach first published by Steve Blank (2005) in *The Four Steps to the Epiphany*. Blank's original thesis introduced the idea that customer development is just as important as product development, and that startups or companies launching new products need to focus on validating that a market exists for their product or service. Blank also suggests that startups are not simply smaller versions of large corporations, but are in fact vehicles created to discover a repeatable and scalable business model.

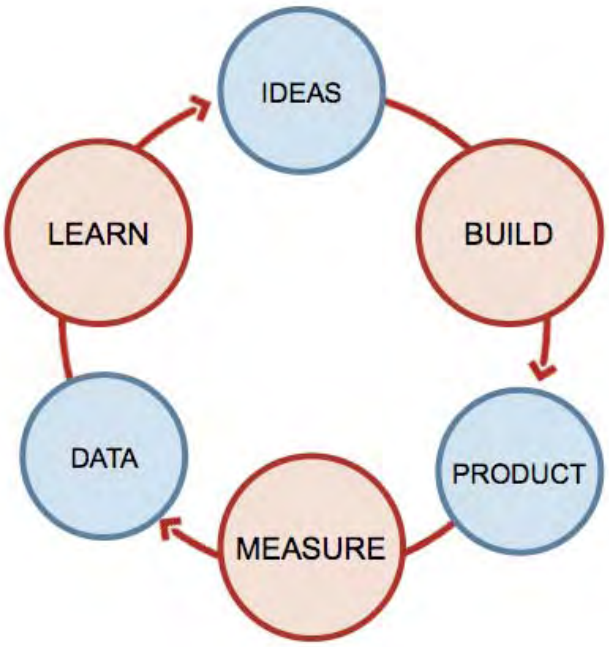

Figure 2 The Lean Startup's Build, Measure, Learn Cycle
Source: Ries, Eric. (2010)

In October 2011, Eric Ries refined his insights into The Lean Startup, which takes the lessons from his blog and Steve Blank, and offers a strategic series of techniques and practices to help startups validate their business model quickly (figure 2). Drawn from lessons learned as a founder of IMVU, Mr. Ries argues that rather than spending 6 months developing a complex and polished software product, startups should develop an MVP (Minimum Viable Product) which can be shared with potential customers as early as possible. By focusing on validating customer demand for a small set of features, startups avoid investing time and resources into a rich feature set for which there is no demand (Ries, 2011).

Figure 3 The Lean Startup Discovers a Problem
Source: Brown, J.B., Grigoriu, M, & Lightsmith, J. (2012)

The concepts and theories introduced by Ries were tested and incorporated into the lab process (figure 3). At the core of this process was the Build-Measure-Learn cycle (figure 2), which provides a clear learning cycle through which ideas and prototypes are shared, tested and iterated upon based upon scientific experiments that measure relevant user behaviors. These concepts and principles spoke directly to the challenges the lab had encountered previously, and offered a clearly defined methodology to quickly test ideas and hypotheses that could be validated and passed on to other teams. With a new process in hand, the lab turned its eye to an appropriate project to apply these new learnings.

WORLD'S FIRST FLASH BUILD

Equipped with The Lean Startup methodology and an expanded team, the Innovation Lab prototyped an Agile + The Lean Startup experience through a 'Flash Build' (table 4) in July 2011.

Table 4 World's First Flash Build

The Challenge:	A weeklong engagement during the busiest event of the year in the middle of Nordstrom's flagship store in downtown Seattle.
The Goal:	Identify needs that customers had within the sunglass shopping experience and build an app to address those needs through rapid prototyping and testing.

The Flash Build allowed the lab members to test the methods of The Lean Startup, moving through the build, measure, learn cycle in order to produce validated learnings for future prototypes. In one week, the lab was able to build a fully functioning iPad application for selecting sunglasses that was compliant with Nordstrom privacy policies and created together with customers and salespeople.

In order to capture the event, the lab had a team collect video and produce a short clip to share within the company[*]. Internal feedback from the video led the team to get permission to share it online through YouTube. In a short period of time, the video was shared with innovation thought leaders throughout the world, including Eric Ries, who reached out to the lab and wrote a blog post about the Flash Build. This experiment also marked the first time the lab created collaboratively with external users in an open environment and shared their process publicly. The attention generated from the video led to an increase in demand for lab services from internal Nordstrom product owners and acted as a catalyst for the lab to make its next evolution.

RETROSPECTIVE:

The risk of making their work process transparent paid off for Nordstrom as the Flash Build generated energy within the company and the broader technology community. While the lab viewed the Flash Build as an experiment and opportunity for learning, executives saw the publicity and excitement generated both internally and externally as a success for burgeoning innovation efforts. The lab was proud of their work but still felt the final results did not reflect a truly customer-centered solution. By working within the store the lab was able to interact with both customers and salespeople, but the conversations between the two were different. The salespeople were able to articulate clearly what they wanted and needed while customers were less explicit about their needs. Further retrospection pointed out that the original concept for the application was driven by the sales team as opposed to originating from observations with customers. As a result, the final

[*] *http://nordstrominnovationlab.com/#case_study*

app reflected a heavy salesperson-centric perspective and failed to truly address deep or latent customer needs. From the original problem of developing ideas that lacked buy-in from the business, the lab had traveled too far in the opposite direction and was generating ideas that were wholly focused towards the business over the customer.

In terms of the successes, the lab had learned firsthand that when you develop with users you can reach an innovative solution that is relevant more quickly. By engaging customers and salespeople in the design process, the lab was able to build a more validated business case for the concept. This was also the first time that a lab project involved 'getting out of the building', a key aspect of both customer development and The Lean Startup. However, it was clear that the final app concept still reflected the biases and needs of company employees, rather than the end consumers. With this learning fresh in hand, the lab began exploring methodologies that would allow them to understand the deeper needs of customers and build services and experiences that addressed these needs.

DEFINING INNOVATION

One of the challenges for any large company investing in innovation efforts is deciding which areas to invest in and tracking ROI of innovation initiatives. A 2008 study by McKinsey found that thirty three percent of executives polled made innovation funding decisions based on "relative attractiveness of individual projects" (Chan, 2008). As Nordstrom's Innovation Committee evaluated the role and objectives of the lab, the Innovation Lab struggled to determine which projects and ideas from external partners were appropriate to work on, and which should remain under the purview of other teams. These discussions and challenges led to the epiphany that Nordstrom needed to define innovation in the same manner as a codified vision or mission statement. The company needed a concrete, thoughtful and shared statement that would provide clear guidance when making decisions and allocating resources towards innovation projects.

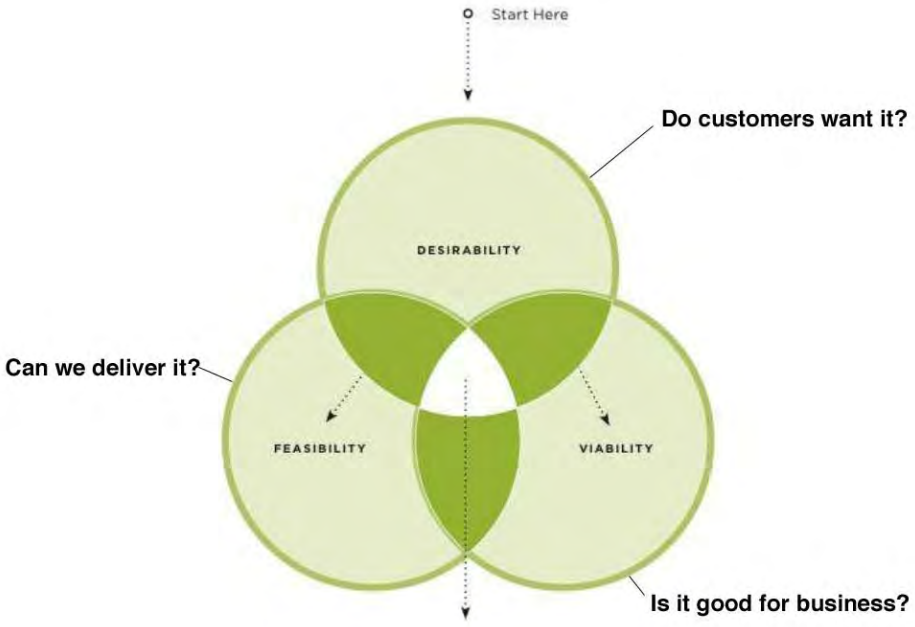

Figure 4. Desirable, Feasible, and Viable Diagram
Source: IDEO (2011) modified by Brown, J.B., Grigoriu, M, & Lightsmith, J. (2012)

Brown and team were tasked with delivering a proposal to leadership suggesting a formal innovation definition for the company. Seeking inspiration, the lab planned an innovation safari to Silicon Valley, visiting IDEO, Facebook, and Heroku (Brown, 2012). One of the biggest takeaways from this experience was the Desirable-Feasible-Viable diagram (figure 4) from IDEO's Human

Centered Design Toolkit (2011), which defines innovative ideas as those that successfully address real user needs (and are desirable) in a way that is viable from a business and technology perspective. It was decided that ideas that were appropriate for the lab would be defined as those that had significant uncertainty around one or more of these three variables. The lab's objective would be to experiment in the areas of uncertainty and rapidly generate validated learnings in order to help business owners make informed decisions. If an idea was proven to be desirable, feasible and viable, it would be expedited to the organization's pipeline and delivered to end users as quickly as possible.

INNOVATION LAB PROCESS 3.0

BUILDING A CULTURE OF RISK TAKING

With its new process and formalized innovation vocabulary in hand, the lab spent the summer and fall of 2011 conducting focused experiments in coordination with other teams. Building off of the lessons learned from the Flash Build and other engagements, the team continued to focus on building short run experiments that lasted 1-2 weeks while continuing to add new members. As the team grew, so did the need for metrics that could be used to evaluate success or failure at an organizational level. These goals were also used to establish the unique expectations of an innovation group. Towards that end, the first metric that was set for the lab was a targeted failure rate of 80% across all experiments, with the stated goal of encouraging a culture that embraced failure and taking risks. Existing research on innovation reveals that this willingness to accept risk is often a key stumbling point for larger organizations. As Edward Hess writes,

> *Innovative organizations build the right culture and enabling internal system that drives innovation behaviors. Along with mindsets and system come the right experimental processes. But underlying all of this is one key concept: you must be willing to accept failures as a necessary part of the innovation process.*
>
> *Why do many large companies buy their innovation? Because their dominant culture of 99% defect-free operational excellence squashes any attempts at innovation just like a Sumo wrestler sitting on a small gymnast. They cannot accept failures. The reality is that failures are a necessary part of innovation.* (Hess, 2012)

Further, existing research on innovation lays out the importance of accepting failure as part of the process (Shiv, 2011). This was more challenging for a traditional and image-conscious organization such as Nordstrom, where the existing culture was primed to deliver polished, perfect products that often took 2-3 years to develop and build. The logic behind an 80% failure rate was that this would force the lab to experiment with high risk ideas that pushed beyond the comfort threshold of the rest of the organization. This was an important step for Nordstrom, as it marked a departure from traditional 'on-time, under-budget' incentive systems and acknowledged that innovation oriented teams require an entirely different set of success metrics.

DESIGN-LED INNOVATION

Following the integration of The Lean Startup into the lab methodologies, experiments became more formalized and the lab began using customer feedback frequently to measure interest in the desirability of ideas. In these experiments, the lab found themselves making numerous pivots from the original idea in order to land on concepts that appealed to customers. Brown and his team began to realize that in order to identify desirable ideas more quickly, they needed to find ways to discover and validate customer needs earlier in their process.

Still inspired by the Human Centered Design Toolkit from IDEO (2011), the lab made the decision to begin experimenting with design thinking as a way to develop deeper customer

empathy and frame problems in a way that reflected the needs of the customer rather than the business. As with agile and The Lean Startup previously, the lab began by integrating methods and tools from design thinking (figure 5), including ethnographic interviews with customers, brainstorming sessions and low fidelity prototypes.

Figure 5. Design Thinking Discovers Customers
Source: Brown, J.B., Grigoriu, M, & Lightsmith, J. (2012)

The opportunity to incorporate this process arose in the late Fall of 2011, when the team partnered with the head of Nordstrom Wedding Suites to develop new services or experiences for Wedding Suite customers. After bringing in several brides-to-be and interviewing them about their experiences, the lab was able to develop insights that led to a service called 'Visualize my Wedding,' an online pinboard that allowed users to create visual inspiration boards for their wedding. Following positive reviews on the early prototypes, the lab leapt in scale from paper to a beta application to be shared with attendees of bridal fairs across the country.

RETROSPECTIVE:

Although the bridal concept was validated by initial user feedback, the pinboard never made it past the early prototypes. The lab attempted to widen the experiment in order to gain feedback from real brides, and worked with institutional partners to email attendees of bridal fairs around the country with an invitation to test the prototype. It was at this point that the lab not only encountered institutional inertia, but also made some stumbles of its own, including a failure to properly invest in building bridges and relationships with other teams.

As the lab stepped back and built empathy for their partners, they soon recognized one of the advantages that they enjoyed was the freedom to move quickly, utilizing a diverse set of technology tools and conducting rapid experiments. These were luxuries excluded from other teams, bound by more rigorous expectations for delivery. The result was a sharp contrast in the speed at which teams were able to move, given the additional requirements and approvals their projects required. Nordstrom teams were experts at delivery and deployment, the innovation lab had to become experts at discovering, validating, and transferring to other teams. As the lab tried to experiment with concepts for Visaulize my Wedding, they scaled too quickly from a low fidelity prototype to full functioning software. Missing opportunities for customer and client involvement.

The challenges posed by this juxtaposition between organization and lab were amplified by the missed opportunity of 'Visualize My Wedding.' Shortly after the failed exchange, Pinterest gained traction and became one of the most popular and trafficked social media sites. One of their larger user segments was composed of women using the site to create visual inspiration boards for their wedding. This validated the design based approach the lab had used for the project, but also highlighted the need to clarify how the lab interacted with other teams.

FROM DELIVERY TO DISCOVERY

One of the keys to addressing these challenges lay in the work of Steve Blank and Bob Dorf (2012), who make the argument in *Startup Owners Manual* that startups are not miniature replicas of large corporations, but are in fact founded with the unique purpose of discovering a repeatable and scalable business model as efficiently as possible. Towards that end, Blank argues that startups must avoid the trap of building teams and processes that mirror those of larger organizations. In the case of Nordstrom, Blank's insight cut to the heart of many issues the lab encountered--it was stuck in the trap of trying to deliver products using the same process as existing teams. In doing so, the lab lost momentum and time from discovery work.

In order to prevent being assimilated into the existing IT process, lab members realized that they needed to make a clear distinction between 'innovation discovery' work and 'production delivery' projects. Drawing from the work of Clayton Christenson's Innovators DNA, a book which had resonated with senior executives, Brown proposed that innovation projects focus on the five discovery skills outlined by Dyer, Gregersen, and Christenson (2011). Associating, Questioning, Observing, Networking and Experimenting all drive towards creating clarity from the fuzzy front-end of innovation (Vogel & Cagan, 2002), a time intensive and dedicated process which requires teams that are comfortable with ambiguity and uncertainty.

With the rest of the organization focused on delivering in overdrive to keep pace with a rapidly evolving retail landscape, the lab had to produce more than just validated learnings and creative expressions of innovative ideas. It needed to be elevated strategically, in order for Nordstrom to realize the competitive advantage from its intricate blend of multidisciplinary thinkers and interdisciplinary activities. Through a focus on discovery, the lab could both support the advancement of existing assets and discover new opportunities for sustained competitive advantages (Rosensweig, 2011).

DISCOVERY BY DESIGN™

As shown through this case study, the story of the Nordstrom Innovation Lab is one of experimentation, a willingness to take risks and embrace failure and an agnostic approach towards the multitude of creative methodologies available. As the Innovation lab worked to develop a framework and process that would be scalable and repeatable, it was forced to experiment and often fail with each new method and process.

As of June of 2012, the working Innovation Lab has pulled in processes, practices and tools from agile development and lean manufacturing, The Lean Startup, and design thinking. As illustrated in the diagram, design thinking is used to discover insights and opportunities, frame design challenges from a user point of view and rapidly ideate and prototype multiple solutions. Once an idea has made it through multiple iterations of testing and prototyping, the lab may then decide to use The Lean Startup cycle to build MVP's with minimal feature sets to gain customer feedback on a scale large enough to validate or disprove core hypotheses.

Figure 6. Design Thinking Discovers Customers
Source: Brown, J.B., Grigoriu, M, & Lightsmith, J. (2012)

The Discovery by Design™ model for innovation (figure 6) reflects the holistic system developed by the Nordstrom Innovation Lab to integrate multiple approaches of innovation:

Design Thinking provides a roadmap to creative & human-centered solutions. It challenges us to see the world through the eyes of our customers, uncover latent needs, and generate innovative solutions that are desirable, feasible and viable.

The Lean Startup focuses on building the right thing for our customers. It gives us a framework for delivering validated learning with tools like the build-measure-learn loop, continuous delivery, and innovation accounting.

Agile & Lean optimize our process and enable us to move quickly. Once we know what to build—agile is how we build. We pair on work, test-drive our ideas, and develop iteratively. Lean reminds us to visualize our work and reduce cycle time.

At the heart of all three approaches are an iterative mindset, a relentless focus on the needs of the customer, and a bias towards rapid experimentation, prototyping and testing.

CONCLUSION

The Nordstrom Innovation Lab has developed organically by focusing on the mindsets and tools inherent to diverse innovation practices, rather than an explicit process or series of actions. The lab has created a set of innovation practices and mindsets (human-centered, collaborative, prototype driven, and embracing of failure), that are not only flexible enough to respond to new methodologies as they emerge, but are also scalable and adaptable to cross-functional teams throughout the organization. In the case of both the lab as well as the larger organization, efforts have been guided by a clearly defined set of end goals and mindsets, rather than a rigid adherence to specific tools or processes (Hackman, 2002).

One of the core advantages of developing a flexible and modular approach to innovation is that it prevents a “bet the company” approach to adopting innovation practices. Recent studies on behavior change reveal a powerful key to innovation diffusion—small changes and ‘little bets’ that transition into new behaviors, outcomes and outlooks (Sims, 2011). One example cited is

comedian Chris Rock's creative process: he spends up to a year trying out new material on small local audiences in order to identify the most popular bits for his HBO specials. In a similar fashion, by experimenting with small-scale bets on new practices and tools within an innovation lab, Nordstrom has been able to identify the most impactful tools and successfully spread them, via workshops and training, to the rest of the organization.

Through the integration of core mindsets and tools drawn from design thinking, The Lean Startup, and agile software development methodologies, the Nordstrom Innovation Lab, a corporate skunkworks project, has evolved into a dynamic capability for Nordstrom (Teece, 1998). The strategic development of this creative function and insights from the team's design-led innovation process provide lessons applicable to other organizations and support a multidisciplinary model that recognizes the need for emergent and responsive innovation capabilities across organizations.

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Pozzey, E., Wrigley, C., and Bucolo, S.Minvielle, N. and Thieulin, B. (2012). *Unpacking the opportunities for change within a family owned manufacturing SME: A Design Led Innovation case study.*

UNPACKING THE OPPORTUNITIES FOR CHANGE WITHIN A FAMILY OWNED MANUFACTURING SME: A DESIGN LED INNOVATION CASE STUDY

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The following paper presents insights found during an ongoing industry engagement with a family-owned manufacturing SME in Australia. The initial findings presented as a case study look at the opportunities available to the firm engaging in a design led approach to innovation. Over the period of one year, the first author's immersion within the firm seeks to unpack the cultural, strategic, product opportunities and challenges when adopting design led innovation. This can provide a better understanding of how a firm can more effectively assess their value proposition in the market and what factors of the business are imperative in stimulating competitive difference. The core insight identified from this paper is that design led innovation cannot be seen and treated as a discrete event, nor a series of steps or stages; rather the whole business model needs to be in focus to achieve holistic, sustainable innovation. Initial insights were found through qualitative interviews with internal employees including: overcoming silos; moving from reactive to proactive design; empowerment; vision for growth and the framing of innovation.

Keywords: Design Led Innovation; Value proposition; Strategy.

INTRODUCTION

Design led innovation has emerged within the field of traditional industrial design as an important addition to the robustness of this profession. This research continues to develop and gain recognition as the value of designers transforms from an isolated, internal departmental role to an encompassing and fundamental capability in the business community. In an increasingly competitive economic environment where product offerings are extremely diverse and crowded, firms are challenged to identify how to increase market share and profitability. More to the point, they are struggling to truly understand who their customers are and how to respond to their underlying needs on a functional and emotional level. This requires consistent re-evaluation of existing strategies as well as the creation of new visions and alternative scenarios (Lockwood, 2010; Matthews and Bucolo, 2011). Designers are able to provide value through shifting existing business models that have become too rigid to grow and keep pace with industry change (Lockwood 2010). For example, design is able to merge market value with enterprise value through fostering multidisciplinary collaboration. Through looking for new opportunities rather than just incremental improvements designers can challenge constraints with creativity and an ethos of fail fast, fail quickly through iterative testing and prototyping. (Verganti and Norman, 2012)

While practical applications of design led innovation within firms have evidenced its success within the business sector (Matthews and Bucolo, 2011; Bolton, 2009; Sato, 2009) there is still

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much to be learnt about how firms internalize design thinking and instil a culture of innovation. This research therefore focuses primarily upon the barriers that are presented during an intervention program. The existing research shows gaps in the availability of systematic case-study information concerning a firm's acceptance and evaluation of how design can add value to the company (Matthews and Bucolo, 2011). These blockages and rigidity against change create barriers that are crucial in understanding what factors are needed to persuade and convince firms of committing to becoming a design-led company. The greatest challenge being that designers need to be able to convincingly articulate the benefits of design led innovation as a process with measurable outcomes that are perceived as relevant to a business leader. Without this knowledge, existing methodologies, frameworks and tools are all but mere surface solutions because they will not be driven over a long period of time. To sustain a design led approach, it requires absolute recognition of design's role in developing a *culture* of innovation. For example, using a business model canvas to identify a radically different value proposition for a particular product line cannot be sustained successfully unless there is recognition of the long-term impact upon the core business model (Matthews and Bucolo, 2011). An organization's capacity to extend an innovative approach to customers is only as effective as their ability to truly shift their thinking in a radical way. Emphasized by Lockwood (2010) as, " ... moving beyond design management to design leadership as a design– minded organization".

Therefore the aim of this paper is to present some initial key insights found during an ongoing engagement within a family owned manufacturing SME based in Australia. It is expected that by identifying some of these emerging characteristics unique to a family owned business, other firms, consultancies and designers can more effectively understand the need to instil change capacity *before* embarking on a design led path. The presence within the firm takes on a disruptive approach, which is illustrated by Christensen (1997), 'many large companies have strategies of waiting until new markets are large enough to be interesting'. Through a disruptive process however, the firm is challenged to focus adequate energy and talent on smaller, highly profitable markets that would not normally be a part of the firm's core business (Christensen, 1997). The hypothesis that has been developed in reflection of existing research is:

> *The ability for an SME to sustain and implement design led innovation ultimately depends on the embedded core culture being able to internalise and adapt to the shift in thinking.*

Moreover the research aims to identify the scale for change opportunity which forms the research question: *To what degree can cultural barriers be overcome through a disruptive learning process to alter an SME's ability to implement change and sustain a design led approach?* While this case is specific to the Australian context, SME's in general must prioritize the ability to remain competitive within an expanding global market. It is therefore imperative that manufacturing firms in particular, which are often historically grounded in traditional modes of strategy; develop the ability to be adaptive to the shifting needs of the industrial market.

CASE STUDY- BACKGROUND

The case firm is an Australian steel fabricating company of a few hundred employees who design and manufacture for the industrial and construction markets. With a long-standing presence in the industry, the family owned business has experienced continual growth. Over the past three decades however, the Australian manufacturing sector has dropped from being 16% of the workforce to just over 8%. As a share of gross domestic product, it has fallen from 29% in 1960 to 8.6% by the end of the decade (Manufacturing Australia, 2012). Consequently, the competitive differences Australian firms once leveraged upon are no longer delivering the same value.

The rapidly changing environment leaves manufacturing firms recognizing the need to move beyond a dominant product focus where the buyer is not passive but active and the process is no

longer transactional but relationship specific (Homburg and Rudolph, 2001). Within Australia, family owned businesses account for around 70% of all Australian businesses, employing 50% of the workforce (Dana and Smyrnios, 2010). Globally SMEs employ more than half the labour force in the private sector (OECD, 2009). As an extremely important asset to the country's economic health, manufacturing SME's will have to redefine their operational and strategic identities in order to remain competitive in a global economy. This strategic shift will challenge the traditional characteristics of manufacturing SMEs and more widely SME's in general.

CURRENT INNOVATIONS

In the past, the case firm has not been adverse to change and has implemented various projects ranging from technology and equipment upgrades, digital sales communication tools and site expansion. In general however, these projects have been an incremental improvement with the aim of streamlining processes, aiding communicative transparency and increasing production capacity. Incremental innovations typically improve performance of existing products along the dimensions that mainstream customer's value (Verganti and Norman, 2012). Reactive in nature, these changes have advanced the company but not at the pace required to combat strong international competition and more importantly, not at the level to increase customer market share. With measurable and foreseeable outcomes that compliment a risk avoidance nature, these projects have allowed the firm to comfortably sustain a place growing with the market but not leading the market.

Alternatively, disruptive innovation has the ability to radically transform the firm's brand and competitive advantage through delivering value to new markets and shifting the entrenched change parameters (Verganti and Norman, 2012; Bucolo and Matthews, 2010). The challenge lay in firstly disrupting the traditional methods and approaches of the company using design led tools. The value of the designer can be demonstrated through radically transforming the business model in prototyped scenarios. As discussed by Neumeier (2008), designers are able to insert 'making' in between the traditional sequence of 'knowing' and 'doing' allowing not only a quicker arrival to a profitable business model but one that does not consume as many resources.

LITERATURE REVIEW

DESIGN LED INNOVATION

Traditionally, design has been practiced in a fairly deductive manner – working from a broad range of ideas and concepts and gradually placing constraints around those concepts through prototyping and observation. Although there are a number of variations, Neumeier (2008) summarises the traditional process as 1. Discovery, 2. Ideation, 3. Refinement, 4. Production. Business executives can engage quite comfortably with this, as the design can be 'managed, tracked, compared and measured like manufacturing' (Neumeier, 2008). Alternatively, Design Led Innovation examines a much broader picture beyond the product alone and capitalises on a designer's unique skill of visualising from a multitude of perspectives. It leverages upon the designer's ability to operate between the 'knowing' and 'doing'- reframing ideas through reflective action. The advantage of this within a business application is that pre-emptive action, tests and validates assumptions made on the part of the firm before financial and resource commitment (Bucolo and Matthews, 2010).

Evolving from a downstream manufacturing role, design is increasingly proving to be a fundamental tool in capturing and applying new knowledge to deliver strategic value at the core of business operations. Capturing new knowledge utilises the designer's ability to consistently reframe scenarios and possibilities in close creation with customers. Reframing scenarios is a key element of Bucolo's (2011) design led innovation framework (Figure 1) where 'reframing requires the firm to take an observation and translate this into meaning rather than solutions.' This is important as it challenges the businesses to unpack the true conflicts, gaps or bottlenecks operational within the business model that perhaps may not have been identified when a short-term solution is put into place. Bucolo's (2011) framework also makes critical reference to the

parallels between the internal and external, operational and strategic paradigms of a successful business model. On the external parameters of business, design led innovation makes sense of socio-cultural dynamics and opportunity gaps; reinventing customer value propositions while concurrently reconfiguring the internal business network and its value chains. Moreover, scholars (Chesbrough, 2007; Fraser, 2007) suggest that capturing and assimilating information across a multitude of platforms, could allow a business to overcome constrains of the corporation's dominant logic, expressed by its extant business model. Lastly, a critical difference also present within Bucolo's (2011) model is that it identifies the role of brand in guiding and driving organisational change. Bucolo's (2011) research proposes the importance for firms to continually evaluate (through reframing) how effectively their internal processes deliver upon their brand values.

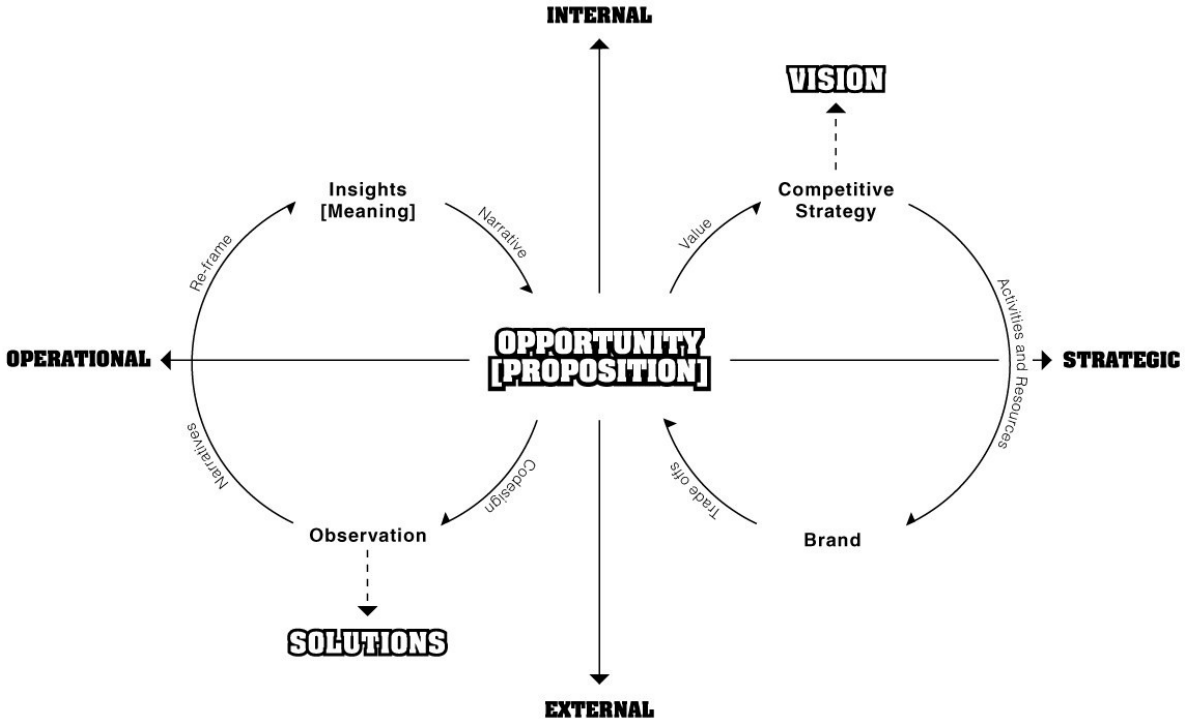

Figure 1 Bucolo's (2011) Design led innovation model

Design led innovation has also been defined as design driven innovation by various authorities on the topic. Verganti (2009) leads the literature on design driven innovation with the core theoretical founding being that innovation through design is about innovating meanings. Verganti's (2009) perspective emphasises the designer's influence of innovation on the intangible social constructs of a product such as symbolic meaning rather than the tangible product centric influencers. Consequently, Verganti (2009) proposes that firms need to act as social interpreters deriving meaning from a number of key stakeholders/actors such as media, artists, other designers and organisations; who are influencing the trends, constructs and needs of consumers. Verganti's theory however does not draw a definitive connection to the business model as a critical and overarching component of a sustainable and innovative design proposition. As explored by Battistella et al (2012), 'Design driven innovation…explains innovation on the products and links it with the surrounding organisational system through the "design discourse", but it does not consider the innovation on the entire business model'.

FAMILY OWNED SME'S

The dynamics of family owned business are widely discussed in literature with focus on areas such as organisational learning, capacity for strategic performance and leadership to name a few. Family owned firms have unique advantages as well as weaknesses that affect their ability to innovate. Scholars concur that because family firms tend to be reactive to their environments and customers – new product development and the processes surrounding those become relatively ad hoc (Oxtoby, et al. 2002; Liao and Rice, 2010). Stringer (2000) expresses that this approach can instil a culture where the scope for innovative change is severely narrowed because the day-to-day activities of the firm are disjointed and complicated. Furthermore, this may create a disparity between new product development and process innovation thus resulting in quite a fragmented understanding of how innovation can holistically assist the firm (Laforet and Tann, 2006). Chandler (1962) states that SME's tend to concentrate on the day to day operational dealings of the company, giving less attention to shifting markets, technology, sources of supply, and other factors influencing the long-term health of the company. Adversely, literature contests Chandler's view and documents the advantages that family owned firms have over privately owned firms. Long-term strategic health is monitored closely which may be indicative of a risk-adverse outlook but also a structure that can better endure turbulent economic times for the sake of the family. Family stewardship is also seen as strategically valuable through the long-term sustained accumulation of industry wisdom and skill (Zahra, 2008).

ORGANISATIONAL LEARNING

Although there are many definitions, Argyris and Schon (1996) define organisational learning as 'the process of identifying and implementing required changes'. Scholars emphasise 'identification' as key to organisational learning as it recognises the importance of knowledge dissemination through channels and communicative culture of a firm (Smith, 2008; Verganti, 2008; Cohen and Levinthal, 1990; Laforet and Tann, 2006). Becoming proficient at this requires the business to be able to have a high level of absorptive capacity which Verganti (2008) describes as: "the ability to understand and value external knowledge and therefore to make sense of it, to learn about it, and to adopt new approaches regarding it." A low absorptive capacity can be detrimental in the development of an innovative culture as processes are built upon existing knowledge and the language of the firm becomes 'local' in nature; lacking consistency of meaning and shared vision (Roy and Gupta, 2007). According to Oxtoby et al. (2002), the dissemination of knowledge within a firm requires 'capturing the learning process' where employees have transparency of information, thus yielding a faster learning response and sustained culture through empowerment.

LEADERSHIP AND INSTILLING AN INNOVATIVE CULTURE

Of critical importance to the change initiatives of family owned SMEs is leadership. Literature suggests that there are unique familial characteristics such as resistance to change of product offerings and core business activities due to an inclination for historical tradition (Smith, 2008). On the other hand, visibility of the leader, and day-to-day involvement in the operations of the family business is a potential advantage in implementation of change (Weisner, 2004). Culture is defined as an interpretative framework through which individuals make sense of their own behaviour. There is some discretion over what culture constitutes within a family business; this paper takes the stance that culture is an embedded, holistic set of values within the firm. From this perspective, a business does not *have* a culture but *is* a culture and so cannot solely be influenced by provisional cultural change tools (Hall, 2001). The bulk of family business research suggests the founding family or leader have a large role in cultivating the shared values, goals and beliefs. In a longitudinal study Hall et al (2001) explored the cultural patterns influencing entrepreneurial or innovative change within two family owned firms. The results revealed the degree of explicitness and openness of the culture as fundamental considerations in striving for entrepreneurial culture.

Of direct relation, the study found that radical change in firms was highly dependent on the redistribution of power relations.

METHOD

The approach to data collection by the academic team will utilise an action research method. Action research is purposed as 'bringing together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities.'(Brydon-Miller et al., 2003) An action research method is particularly appropriate to the aims of this project because there are two significant bodies of knowledge to emerge from the people involved. A longitudinal immersive process challenges the mentor to continually reflect on the effectiveness of techniques and approaches and allows the scope to test more than one method of data collection (Costello, 2011). This is particularly important, as a key objective of the research is to see how different approaches elicit barriers or open doors to innovate. Secondly, an action research approach over an extended period of time allows the participating business to develop a trusting non-biased relationship with the external mentor through the co-exposure of the internal culture, processes and activities (Costello, 2011; Byrdon-Miller et al., 2003).

The table below outlines the study's approach within the case firm. In depth qualitative interviews with internal employees will enable a longitudinal analysis of the disruptive design process. As indicated by the table below, the findings presented within this paper are based on interviews at the 3 month stage within the context of a 12 month research engagement. This first level of employee research sought insight into how the company operates, the goals and priorities as well as the brand attributes. Subsequent interviews will seek to understand employee's perceptions of various design collaborative methods as they occur and how they effectively or ineffectively aided the company in becoming design led. The insights of successive interviews will be compared with previous interviews from the first phase of research to identify if there has been any change to the participant's understanding of the design led innovation engagement. Semi-structured questions were used to guide the interview with additional questions specific to the participant's role included.

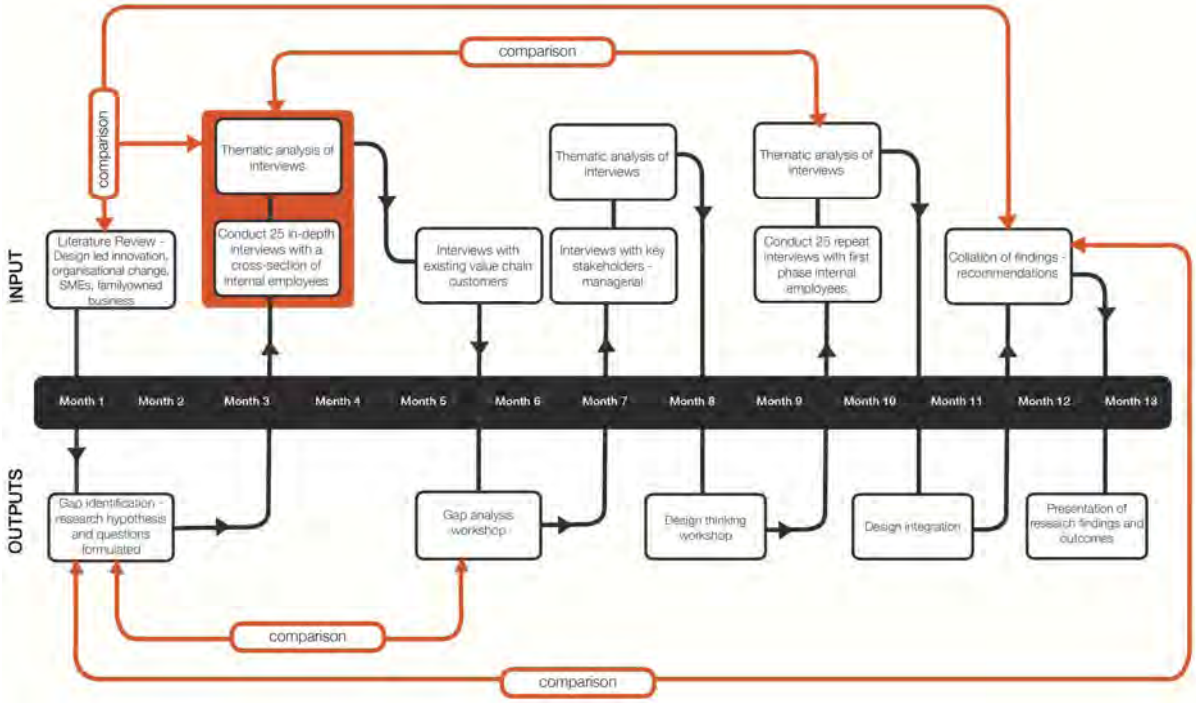

Figure 2 Project method for design led innovation case study (Rectangle blocked with orange indicates the research stage presented within this paper).

To effectively understand the existing culture of the firm however, a level of disruptive presence will bring about some unstructured methods according to the specific cultural barriers that may arise; in turn the outcomes of those methods will be observed as either aiding change or slowing change. For this reason, it is important that a stringent learning trail is simultaneously documented including raw data such as completed questionnaires, interview transcripts, observation/experience journal, audiotapes and videotapes (Costello, 2011).

KEY INSIGHTS: OPPORTUNITIES FOR INNOVATION

The preliminary insights emerging from the first phase of the ongoing engagement are indicative and should be understood as opportunities for the firm to explore during their journey to becoming a design led company. The themes presented are representative of the challenges many SME's may face when managing growth. Often, firms are able to address identified weaknesses on the growth path but struggle to transform dialogue into action amidst the day-to-day operations of the firm. For many, the difficulty lay in managing growth and changing as quickly as the market demands - while maintaining revenue from core business activities. The table below outlines the key findings of the thematic analysis, which are further outlined in the document.

Figure 3 Codes and their subsequent descriptions used for the thematic analysis of qualitative interviews

OVERCOMING SILOS

The first key theme to emerge from the participant interviews was the gaps in current communication and training. Given, some of this sentiment was reasoned to the high volume of manual systems within the firm resulting in the reliance on verbal communication and human diligence. The over-arching need however to elevate communication into a collaborative, transparent operation was evident. Participant D noted: *'You know it's just trying to break down silos…people kind of don't have a consistent goal they're all working towards at the end there.'* Creating dialogue between colleagues to avoid assumptions and create consistency was partially reasoned to the low level of policy and procedural enforcement. With a high level of staff retention, the firm has a unique and strong culture of community, which has led to a 'local language' between departments and individuals in the company. The difficulty here lays in the dissemination of knowledge and raising all employees to an even knowledge platform. One such example may be maintaining distributable records of key information in which a participant reasons '*…there is no*

impetus to write it down because they see there is no requirement to and I'm not leaving anyway sort of mentality'. Consequently, the participant notes *'…we continue to make the same mistakes over and over again, rather than learning from those mistakes.*' Identifying core procedures and policies; more-over auditing the change behaviour not only creates an efficient workflow for the internal operations but a fundamentally different customer experience. As noted by Participant B, *'Policies exist within the company but because they are not enforced, it presents a big change in the way the business handles its customers.'* Seamless touch points between company and customer rely on streamlined procedures developed to parallel the core value proposition and brand philosophy of the firm.

The conduit of information from external to internal staff is also identified as a key area for development. As Participant E expressed, '*I've got to make sure our reps are confident to talk to the customer…because they're the ones that get the feedback - I need them as my eyes and ears.'* This relies on rich information exchange through formal techniques and tools. Some participants noted how the quotation style, pricing and knowledge were not consistent with the internal departments expectations thus resulting in frustration and re-iteration of the order specifications. This is consistent with SME literature where difficulties borne of limited communication within a fast moving context are often quelled through ad-hoc solutions; further entrenching a multitude of habitual processes (Oxtoby et al. 2002; Stringer, 2000).

MOVING FROM REACTIVE TO PROACTIVE DESIGN

The opportunity to leverage and optimise new product development within the case firm was expressed as a key priority of the design led program. Three key factors emerged as critical to the design-led goal including greater emphasis on initial market research, design freeze and customer contact. Described by several participants as 'reactive', the case firm has typically developed new product from a desire to play in the same market space as competitors or from adding a customer project design to the product portfolio. In effect, the design objective is not confirmed with the market and developed without a clear and shared value proposition to guide the designers. As Participant C, a designer stated, '*'I still don't know what market the product went into. I know it's a solid product but I don't really know what it's for and I think we lost sight of that a long time ago…or whether we even knew.'* Consequently, the design development lacks a program with defined constraints. Participant D expressed: *'…with no design freeze…we're still changing the product, we still haven't got full clarity of what the customer wants and what the purpose is.'*

By placing the design team in closer proximity to the customers and allocating time/resources to the dedicated generation of ideas or R&D, it is possible to create original value propositions and identify new competitive differences within the market. As Participant B stated: *'We should be able to go back to design documentation and say this is what the core design principles are…and have a trail of information from where we started, why we changed and where we are now.'* Investing time in the front end of design development such as customer research and low-fidelity prototyping enables the company to draw out problematic design faults before financial commitment. Participant A put emphasis on *'challenging the way we design, to deliver the product to the customer for more value to them as well as ourselves.'*

VISION FOR GROWTH

Within the interviews, participants were asked to share their views upon how effective the design led innovation engagement could be. Interestingly, several comments were made about using the current branding activities to leverage the project's goals. Participant E showed understanding, *'You've got to change the entire company's point of view of the company itself before they will behave differently.'* While the branding exercise could provide a good platform, the greatest challenge is actively prioritising and maintaining the brand values that unite the business to an ultimate goal. This means setting strong core brand values that are true market differentiators and

using that to support purpose, drive and enthusiasm within employees of the firm. One participant concluded the interview with a rather apt observation of instilling a design-led culture, *'You've got to get people enthusiastic about questioning their thoughts - that will be the key.'*

The second concurring insight was the need to use specialist knowledge of the industry environment and application needs to leverage the firm's position in the market. As an Australian manufacturer that has always had to compete with international competition, the firm has built good customer relationships through a 'local supplier' approach. The industry dynamic is shifting however and with it the expectations of customers. Access to information quickly and efficiently will be key imperatives in delivering value. It also requires reframing what the firm's core product and service offering encompasses - shifting from a product centric to a knowledge/service centric approach. *'So it's more than just a box – it's technical solutions'* explained Participant D. Another participant suggested the need to move away from the small business supplier mentality to one that can deliver real specialist knowledge - *'We need to be more scientific in our approach; we have to be delivering targeted value.'*

EMPOWERMENT AND OPTIMISATION OF SKILL

Empowerment and optimisation of skill is a necessary development of growth. Decentralising decision-making within a growing firm can enable greater efficiency of projects and encourage ownership of roles throughout the company (Weisner, 2004; Zahra, 2008) The interviews revealed that while the case firm placed empowerment as a priority, there was limited translation of that throughout the firm*. 'Upper management might be trying to empower people…but people don't feel empowered and they feel they need to get the collective ok.'* Maximising allegiance within the design and engineering department specifically was seen to be a key factor in enabling innovation to occur. One participant noted, *'Ideally if you want to keep those people (design and engineering) here and keep them entertained…it's the perfect opportunity to capitalise on those skills they have.'* Cultivating those skill-sets should lead to a level of increased responsibility and authority. As a result, improved efficiency of resources and clarity of design purpose can be leveraged – Participant B stated*'…the nature of this company is that you have so many different people with input from every area and (the design) changes forever.'* Recognition of the need to engage multiple facets of the company to create an enriched understanding of the opportunities for innovation made through Participant C: *'We need broader engagement because…it is a change management initiative so if people aren't engaged or aren't involved in the process we are more likely to have roadblocks.'*

UNDERSTANDING INNOVATION AND FRAMING POSSIBILITIES

This theme captured how participants perceived the company's ability to innovate with specific reference to product and market expectations. This was critical to understand in the first phase research as it reveals a key insight of the design led innovation project: the need to unite the company with a cohesive vision of how innovation can be of value beyond the product alone. For example, when asked if they perceived the case firm as innovative, Participant A responded, *'I think so, but it can be a bit difficult when it's boxes'.* Furthermore, the specifics of the product requirements were seen to limit the capacity for innovation – *'we are constrained by the standards …we need strength, longevity, safety…all of this is very well designed so we're kind of a bit locked in after that.'*

Some participants saw the industrial market (in which the case firm operates) as having limited receptiveness to innovative solutions. As stated by Participant C, *'I don't think it's a market where innovation drives the products and I don't think it's a bad reflection on us; I think it's just the reality.* This reinforces the opportunity to elevate the firm's core activities from steel fabricating mentality to a technical solutions mentality. Participant C noted, *'I think if the market required us to be innovative we could be but it's like whether we're pulling innovation into the market or pushing it*

onto people'. Growing in the market as technical specialists has the capacity to alter employee's understanding and perception of innovation. This can lead to greater enthusiasm, which will in turn flow on to the customer.

DISCUSSION

The indicative findings included a range of factors including areas in new product development, learning and knowledge and creating the impetus for innovation. Some findings are in concurrence with the literature of family owned SME's previously presented. Empowerment as a key opportunity to move forward is echoed by the research of Hall et al, (2001) and Oxtoby et al. (2002) where they stress the importance of decentralising power to enable the flexibility to respond quickly to changing markets. Furthermore, this could also have a flow on effect of enabling the firm's vision for growth or strategic direction. Research suggests that new initiatives, which are implemented through empowerment and responsibility, can avoid 'cultural bypass' as opposed to be concentrated at the management level (O'Regan, 2006).

The findings also support research into the organisational learning structures of family own firms (Laforet and Tann, 2006). Scholars identify a number of influencing factors causing and affecting the communication and learning of family owned SME's. If we imagine culture as a conduit of communication and learning in the firm; it is acceptable that strategic visions and culture are inseparable. If literature suggests that SME's tend to operate in an informal manner where routine activities take precedent over strategising for the future; it remains a challenging task to clear the culture conduit enough to develop a unified strategic vision. Furthermore, balancing vision for growth with recognition of the need to sustain economic return from core business activities is important.

From a design led perspective, it is important to assess these themes simultaneously and with considerate understanding of their impacts upon the firm as a whole. When viewing the themes in light of existing family/SME research, the firm's vision for growth appears to underpin all other identified themes. Meaning that, before other issues can be addressed, the firm first needs to develop a strong vision for growth (shared by entire firm), which will drive collective prioritisation of the ensuing themes. This is affirmed by a number of authorities (Laforet and Tann, 2006; Hall et al. 2001; O'Regan et al. 2006); Laforet and Tann, (2006) state that SME's *'*capacity to plan ahead, to have a clear strategy and to manage strategically…is reflected in companies being market-oriented and willing to learn as well as to innovate and take risks'.

INITIAL CONSIDERATIONS FOR UNPACKING OPPORTUNITIES

The research contends that there is little doubt that family-owned SMEs are capable of effective innovation (O'Regan, 2006). The challenge however, is enabling firms to identify the opportunities and advantages that are available to them. A design led innovation approach could have the potential to assist firms yet remains largely unfamiliar to the corporate sector as an accepted approach. Therefore, one of the greatest challenges facing designers leading the design led innovation agenda is framing and articulating a design led approach in a way that is meaningful and quantifiable in business discourse. Companies that are not familiar with design as a strategic advantage require careful navigation of objectives and goals in the front-end phase of a design project.

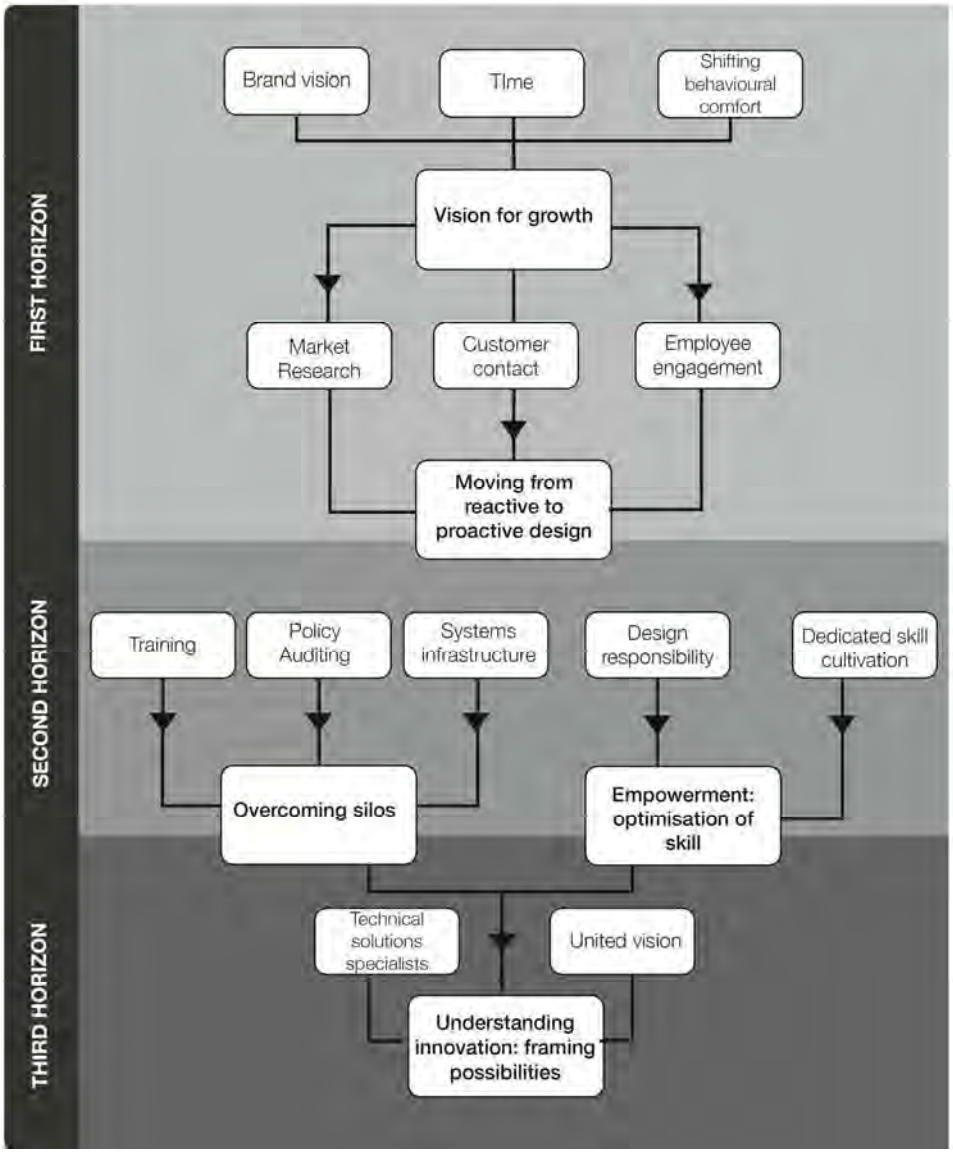

Figure 4 Themes (and sub-themes) arranged according to the firm's ability to target and implement.

Moreover, it is important that firms are recognised as having varying structures, processes and cultures that may be strengths or weaknesses in the journey to becoming a design led firm. It is important then to contextualise emerging findings within the project scope. The diagram above (Figure 4) indicates which themes (and sub-themes) have the capacity to be shifted through the design led innovation engagement of one year. They have been categorised subjectively with respect to personal experience within the firm. The diagram shows that the firm's first horizon strategy should look at creating a vision for growth through the broader brand values of the company. To do this, the firm needs to make time amidst day-to-day operations and test where behavioural comforts may be hindering the brand vision and execution. Through doing so, the firm could then begin to evaluate other major opportunities for improvement such as moving from reactive to proactive design, overcoming communication silos and empowerment. Finally, the third horizon strategy, framing innovative possibilities is attainable because not only is the structural capacity of the business able to accommodate innovation but the scope for innovation is realised.

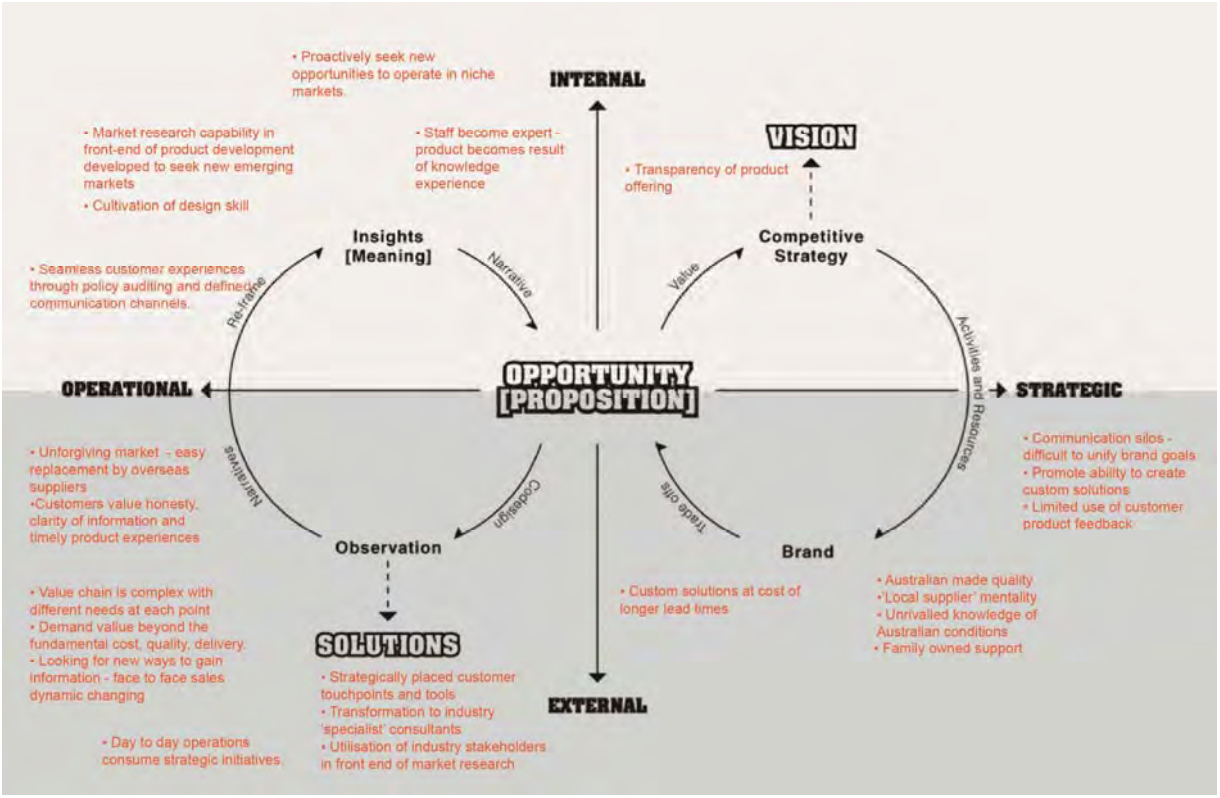

Figure 5 Bucolo's (2011) design led innovation model in relation to indicative findings within the case study firm.

Figure 5 illustrates the use of Bucolo's (2011) design led innovation model – where stages in the model have been populated with initial findings from the project. The mapping is an iterative process assimilating a mass of information gained during the project immersion and research (first 3-6 months) into some overarching findings. Importantly, the first author began mapping in the external, strategic sector addressing the firm's brand and perceived customer value. Gradual exposure to the internal processes, culture and activities simultaneously informed the insights gained from external customer research. Evidently, this demonstrates the starting point of a design led innovation approach is significantly different to a traditional design approach, which would largely remain within the external/operational phase. Having said this, it is possible that every firm has unique characteristics, which may require a different path of navigation around the model.

SUMMARY

The core problem identified from this paper is that design led innovation cannot be seen and treated as a discrete event, nor a series of steps or stages. Many business cultures have political, social and operational complexities that require very thorough navigation and consideration of factors that have traditionally remained outside the scope of design. Therefore this research is imperative in understanding the internal barriers and conflicts firms, consultants and mentors may face when trying to shift an organisation's established processes and culture. One of the key challenges is effectively articulating the story of pursuing a design approach, which guides the journey in a way that is meaningful to business discourse. This is critical in ensuring firms are able to internalise and subsequently steer the wheel of innovation autonomously.

Some indicative insights have emerged from the first phase research of qualitative interviews with inter-departmental employees of the case firm. The major themes include: the firm's vision for growth, moving from reactive to proactive design, overcoming silos, empowerment, and the framing of innovative possibilities. Identified as business opportunities, these initial insights will be

used to compare the effectiveness of the design led engagement, as participants are further involved in workshops and various design initiatives. This paper has also highlighted the importance of contextualising these themes in relation to one another and in relation to the current positioning of the firm. In this case, the unique familial context will play a role in how these themes are digested and what they mean for a family firm seeking top-line growth and innovation. Meaning that, an external mentor must continually re-frame the solutions (presented themes) to discern if they are the true source of a firm's barriers to innovation. Critically analysing the *meaning* of the insights rather than directly tackling each one in an isolated fashion ensures their impact is understood in relation to the entire business model. Understanding the up-stream and down-stream elements that impact a firm's capability to execute value helps design intervention programs to deliver more efficiently. Ultimately leading to numerous innovative benefits "not just in new products or services, but through employing, skilfully managing and soundly implementing design throughout a company's business strategy" (Matthews and Bucolo, 2011). Moving forward with the insights presented within this paper, the project will continue to evaluate how these factors can play a role in facilitating the firm's transformation into a design led company.

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LEADING
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MANAGING BY DESIGN – ENACTED THROUGH SITUATED NETWORKS

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The purpose of this paper is to present key findings from PhD research on how a large complex public sector organisation, the Australian Taxation Office has adopted human-centred design into its management work and sustained this over a long period of time. The thesis is that 'managing by design' comprises a collection of human and non-human actors that make up networks of action and interaction, which over a decade have permitted the embedding of design in the management practices of the Australian Taxation Office. The application of Actor Network Theory (ANT) is used to draw out the analysis of the process of translation of managing by design which results in a networked view of design in practice. This paper discusses the translation process and the critical strategies used to create and sustain managing by design as situated networks.

Keywords: Managing by design; Actor Network theory; Human-centred design

INTRODUCTION

The excitement that design might bring a new pattern of working into organisational life is consuming many people's interest. In particular government organisations are increasingly becoming interested in design. The changes in public sector management over the last few decades due to environmental, market, technological and political factors (Osbourne and Gaebler, 1992, Osbourne and Brown, 2005, Cullen and Cushman, 2000) has triggered reforms which propose new and different models for the public sector management to do its work. One of these reforms has been a shift to citizen centric or community centric emphasis to encourage innovation, strengthen democracy and overall to improve the effectiveness of public services. In concurrent and unrelated literature, the design studies literature models of design and design thinking have evolved to play a role in the work of organisations and public sector organisations. Junginger and Sangiorigi commented on this:

> *Of all organisations, government agencies are often perceived to be the least likely places for design activities (Junginger and Sangiorgi, 2011: 481)*

Junginger and Sangiorigi argue that public sector organisations show "less flexibility and engrained thinking" (p481) and most of their structures are organised around the "procedural and legal demands than on the needs of the people they serve" (p481). Junginger and Sangiorigi go on to argue that the introduction of human-centred approaches is gaining application in public sector policy and management. The application of design in public sector organisations is emerging. This

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emerging literature is just that, emerging, so more cases need to be discussed and explored. The opportunity is to learn how and why public organisations embed design in their work? Also to understand how design might be a plausible model in public management to achieve its innovation and public value outcome goals? Current shifts in public sector management, including a stronger emphasis on citizen centric approaches and community engagement, mean that public managers are in need of practical models. These practical models help bring together diverse participants and their perspectives to best carry out the type of work where government policies are implemented effectively and efficiently because they incorporate the needs of citizens. The opportunity to define how the public manager might go about enabling productive citizen centric engagements can be seen through the vehicle of design. Increasingly organisational leaders are raising the question – how might a public organisation embed design? This is turning the attention not only to how to go about this work but what necessary spaces in organisations are created to ensure design is embedded in its management arrangements sustainably?

This paper will discuss how organisations can adopt and embed design and, in particular, contribute empirical evidence of public management adopting design which directly contributes to the growing interests in citizen-centric management practices in public management and leadership (Bingham et al., 2005, Dryzek and List, 2003, Gutman and Thompson, 1996, Thomas, 1995, King and Stivers, 1998, Yang and Pandey, 2011, Osbourne and Brown, 2005: 62, Leadbeater, 2004, Leadbeater et al., 2008). Some may think the embedding or institutionalisation of design could be achieved using simple models of change or formulaic approaches. This paper disputes this idea and discusses institutionalisation can be understood in terms of translations through networks of actors illustrating the multiplicity of doing design as a sustained practice. This is an important contribution of this study because it has been noted in the literature "… genuine engagement in co-production of policy and services requires major shifts in the culture and operations of government agencies" (Holmes, 2011: executive summary).

The literature to which this study contributes is not only the public management discourse as described above, but also the design literature. The interest in the design discourses to apply design methods and approaches to more complex problems has been promulgated by the work of Buchanan in his four orders of design (Buchanan, 1992). The problems which could be considered social or system wide (the fourth order) such as the problems explored in this study of tax administration, are increasingly considered design territory. The opportunity is to contribute to a deeper understanding of the nature of these problems and the methods to address or resolve them. The exciting part of this study is that, according to Buchanan, this is a relatively unexplored area. As Buchanan says this "could be part of a new practice of design" (Buchanan, 2007). In exploring this understanding, this study has looked at the performances of design in the management work of the ATO through the lens of Actor Network Theory. This approach has drawn attention to the human and non-human actors present in designing as a network of actions and interactions and worked in the discussion of managing by design. This paper will not go into the details of these practices but rather highlight how the case organisation has mobilised its people and practices in managing by design.

BACKGROUND OF STUDY

There is very little empirical evidence of how large complex public sector organisations take on the development of human-centred design into management work and sustain this over a long period of time. This paper presents findings from PhD research which aimed to explore the adoption and embedding of design as a management practice in the Australian Taxation Office (ATO). This research defined the concept of 'managing by design' as a means to bring a stronger focus on the human experience with the tax system as a core component in some of its management work. The ATO is one of the largest government organisations in Australia and employs over 22,000 employees. The ATO is responsible for the administration of taxation and superannuation legislation in Australia which means millions of human interactions each year. The

ATO is a pioneer in applying design methods to its administrative work (Body, 2007; Junginger, 2006; Terrey, 2010). This study is a single case study design and includes exploratory interviews with designers and management in the ATO, review of organisational documents and auto-ethnographic accounts from the author's own experiences as a designer in the ATO. In the figure below the methods used in this research are illustrated.

Table 1 Methods used in the study

A postmodern take on grounded theory (Glaser and Strauss, 1967) situational analysis (Clarke, 2003, Clarke, 2005, Clarke, 2009) is coupled with Actor Network Theory (ANT) (Callon, 1986, Callon, 1999, Latour, 1999, Latour, 2005, Law, 1999, Law, 2007) as a combined methodology package defined the strategy or the plan of action for this research.

The application of Actor Network Theory (ANT) was used to shape this research and draw out the importance of the human and non-human actors that make up networks of action and interaction, which over a decade have permitted the embedding of design in the management practices of the ATO.

UNDERSTANDING DESIGN AS A NETWORK

If we take the practices of managing by design as a social phenomenon then according to Latour we can view this as a "movement, an interaction, a transformation, an enrolment" (Latour, 2005:64-65) of some kind. The process of translation is contingent upon human and non-human elements coming together at different times and locations. The point of interest is understanding how managing by design was argued, positioned and given space in the complex public organisation of the Tax Office. The embedding and embodiment of managing by design in the ATO is a process of constant translation. This is achieved through the creation of networks comprising many actors – human and non-human. There is no hero narrative or a narrative of simple causes and effects, but rather managing by design is a constant process of translation over time. That this translation is contingent upon a range of factors invites the question; what has enabled sustained practices of managing by design within the ATO?

THE FOUR MOMENTS OF TRANSLATION

The analytical framework of sociology of translation is a way to draw out the multiplicity of actors and actions which give a more dynamic, fluid and contingent nature to design evolving in the ATO. The 'four moments' of sociology of translation: Problematization, Interessement, Enrolment and Mobilisation (Callon, 1986) will be used.

THE PROBLEMATIZATION OR BUILDING THE CASE FOR DESIGN

In the first moment, *problematization,* the elements that acted to bring about the possibility for design to be taken into the management practices of the ATO are analysed. The identification of these elements could retrospectively be drawn neatly, and presented as a coherent and organised set of elements. However it should be understood that there is never such a simple path and there are many elements at play that coalesced to bring about a case for design. Given that, there are some critical elements which were identified, and once drawn together permit an initial understanding of a network of actors – human and non-human that permitted an argument for design to be a practice within the tax system. The problematization for design could be interpreted as opportunistic. There were numerous elements at play. For example, a case for change to the way taxes were formulated and implemented was triggered by an external review, namely the Ralph Review. This review highlighted the need to strengthen the tax policy intent with implementation by taking a more deliberate integrated tax design process.

Another element was the involvement of a variety of business and design academics and consultants working across the tax system, inspiring new models of thinking and working such as systems thinking and interaction design. The senior leadership in the ATO embraced new ways of working, in such areas as strategic thinking and planning, positioning themselves to be open to change and evolution. And lastly cases of social unrest from the taxpaying community and tax professionals who were attempting to deal with a new tax system.

These elements all contributed to carving a space for managing by design in not only the ATO but the Tax System. The case for managing by design was contingent upon all these factors. The commonality across these elements was that the experience of taxpayers and key users in the tax system was an important characteristic that needed to be intentionally designed. The coalescence of actors, activities and interactions highlights the complex and dynamic of the process of problematization. In this process many alliances forged and formed between multiple actors in the tax system. It is tempting to think of this moment of sociology as simply a series of events. Instead significant events and interactions point to the ongoing alliances and networks that are formed and reformed to bring about a case for managing by design. The diagram below presents a model of the multiple actors coalescing around the problem and the initial proposition of managing by design.

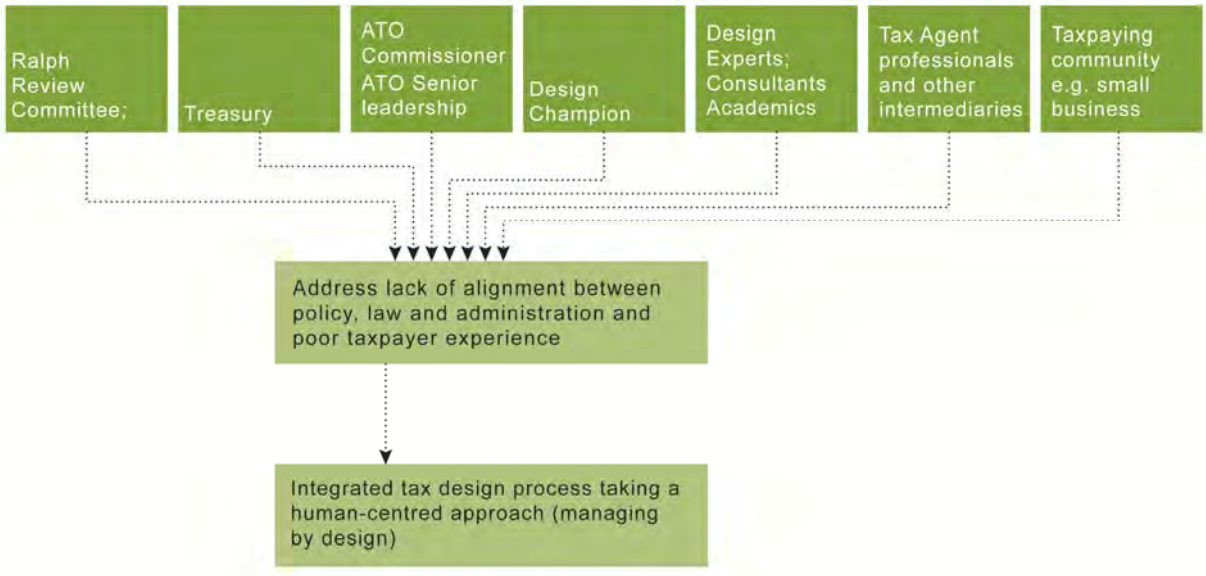

Diagram 1: illustrating the Problematization Phase (Source: Author 2012)

THE INTERESSMENT PHASE OR THE DEVICES TO PERSUADE

In the second moment of *interessement,* the argument for change defined through problematization is now realised through the actions of entities, who attempt to impose and stabilize the identity of managing by design on the other actors. To understand managing by design it is important to understand the key actors and what they did and to whom to persuade them to adopt a design approach in their work. It was also necessary to understand the strategies employed to get more actors in the ATO engaged in following design.

A key aspect of this stage of translation is to understand how actors who were not yet convinced that managing by design was a way to work were persuaded to do things differently and to see managing by design as the alternative they needed to pursue. This is about the multitude of devices used to create interest and to persuade others that managing by design is a solution to their problems (Callon, 1986:203, Vurdubakis, 2007: 430). Interessement devices used in the translation of design in the case organisation include such things as design conferences, pilot design projects, user research and codified design theory and methods. The role of the organisational leadership, the Design Champion, the Integrated Tax Design team and engagement with academics and consultants was to develop and execute these strategies. These devices were used to persuade organisational members from all management levels through to employees in teams to recognise that the way they performed some aspects of their work needed to change to a design approach to achieve the outcomes they needed to deliver. The diagram below illustrates the actions of human actors using a variety of non-human elements or strategies to persuade other actors in the Tax System.

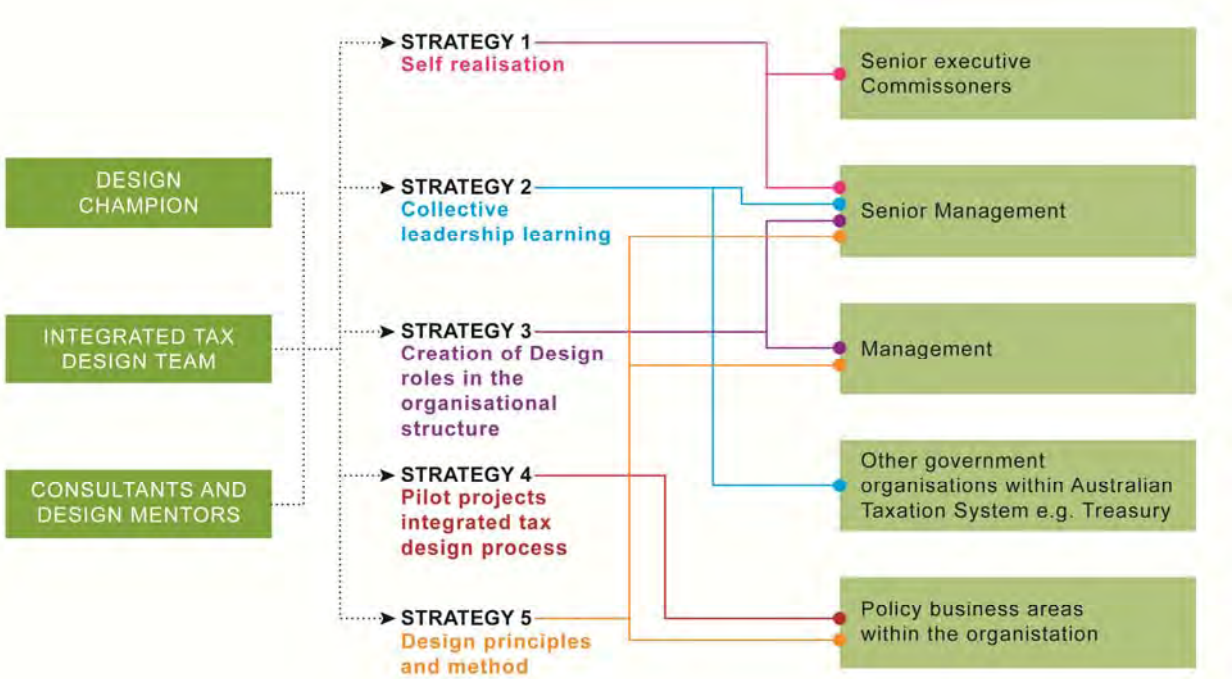

Diagram 2: illustrating the Interessement Phase (Source: Author, 2012)

EXAMPLE STRATEGY: SELF REALISATION

Key actors, such as the Integrated Tax Design team, created new representations of taxpayer experiences to persuade the senior leadership group. These representations included physical modelling of the taxpayer's journey through the tax system and using personalised stories of real taxpayers. Other representations included simulating taxpayer interaction points, such as completing key forms. One story told by a senior leader was about a senior leadership event where a task was put to the senior leaders to work through one of the business forms. According to one senior leader :"The event was fascinating, for the first time the leaders realised that what the organisation had designed and imposed on small business was not easy. The usability of the form was lacking" [Interview, Senior leader #1, 2008]. There were other examples of real every day poor design which were presented to the leadership group, and through their own participation in these events self realisation of the change needed was achieved.

THE ENROLMENT PHASE OR THE STRATEGIES TO GAIN FURTHER SUPPORT

The third moment of *enrolment* discusses the types of situations where actors come together and occupy roles which enact managing by design. These are the situations where the network of managing by design starts to achieve an identity (Vurdubakis, 2007). The process of embedding design in management of the ATO required strategies to gain further support from the organisation's leadership and key business areas.

One distinct strategy was running a research project called 'Listening to the Community'. The emphasis on understanding users' experiences with the tax system was a key aspect to the rationale behind managing by design in the ATO. The understanding of this experience based on community driven complaints and actions, was not the only means to gain an understanding. A strategy to seek out an understanding of the community experience was to initiate a project called *Listening to the Community*. This project involved an external research organisation, the Integrated Tax Design team, and key leaders of the ATO. The research engaged different groups

in the community from small business to large business, to individuals, and to tax agents and distilled the administrative irritants that were getting in the way of a good experience with the tax system.

Another enrolment strategy was to seek out key business areas that showed an interest in working with the Integrated Tax Design process and team. This strategy was to work with people whose interest was triggered from other strategies and could see the value of design. This led to two approaches including outsourcing Integrated Tax Design team members to business areas for distinct projects and establishing distributed design centres within business areas hence creating a network of designers across the organisation.

The enrolment phase should be seen as ongoing and the strategies described reflect a combination of point in time strategies (e.g. Listening to the Community research project) compared with strategies that were used over time (e.g. working with supportive business areas and building distributed design centres). Importantly, these strategies involved internal and external interactions hence establishing a tension between support for managing by design from outside and inside the organisation. This stage of enrolment critically builds further support for managing by design, employed by both the leaders and the established design teams within the organisation, and using strategies which draw on evidence of taxpayer experience with the tax system and strengthening of the skill base and people allocated to do design work across the organisation.

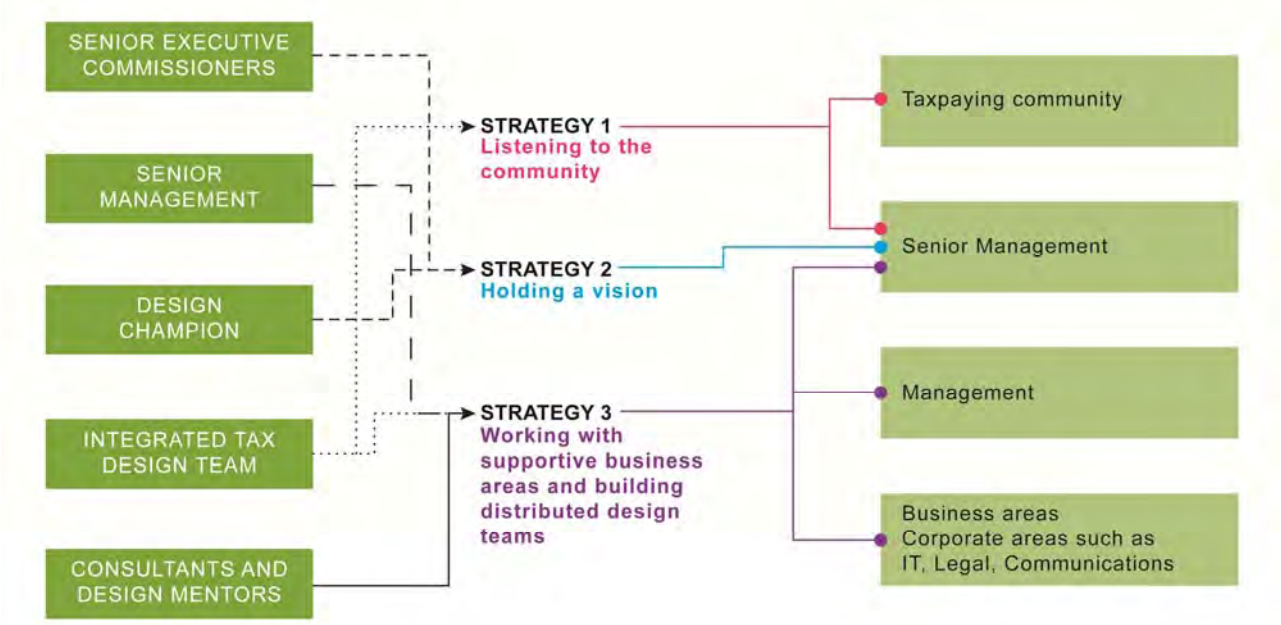

Diagram illustrating the Enrolment Phase (Source: Author, 2012)

EXAMPLE STRATEGY: MAINTAINING A VISION

The action of senior leadership maintaining a narrative about managing by design was evident over time. As the case organisation changed leadership, moving through its annual strategic and business planning cycles the messaging and communication about managing by design's importance was maintained. This was evidenced by different Commissioner speeches over the decade from 2000 to current that demonstrate that taking a human-centred approach is an important part of the organisational strategy. An example of this can be found in a speech by one of the Commissioners of Taxation "By listening to and co-designing with taxpayers and others, we can build community trust in our administration and reduce compliance costs. This more empathetic, user-based approach ensures that administrative solutions are designed and built around what works for taxpayers." (D'Ascenzo, 2007)

THE MOBILISATION PHASE OR HOW THE NETWORK OF MANAGING BY DESIGN CONTINUE TO SUSTAIN THE WORK OF ENROLLED ACTORS

The fourth moment, the mobilisation phase, describes how the network of managing by design continues to sustain the work of those enrolled actors. The question here is how can the collective actions of public managers across the ATO be carried out in ways that resemble managing by design? How was it possible to weave managing by design as a management practice across the organisation in a way that was understood, aligned interests and permeated over time? The sustained practices of managing by design are the result of standardised objects or packages which have been created and maintained in the organisation to 'enrol others' and give stability to the practice of managing by design. Using the 'standardised package concept' developed by Fujimura (1996) this allows a useful analysis of "how collective action is managed across social worlds to achieve enough agreement at various times to get work done and to produce relatively stable facts" (Fujimura, 1996: 168). These standardised packages can be considered durable elements of the managing by design network permitting the practices of design to remain relevant and viable in the ATO.

The first package of standardised design theory and methods comprised a project cycle or the 'design wheel', seven design principles, design methods and specified processes to conduct a design project. These were materialised into a Design Guide. This package defined new organisational routines which complemented existing organisational routines thereby preserving other social world's routines. This succeeded in bringing many different social worlds together. This is important in large bureaucratic and technical organisations like the ATO where many dominant organisational routines exist.

The second package was the deployment of design roles and distributed teams. The creation of design roles was a deliberate approach to gain support across the ATO to follow a design approach. The creation of new roles crafted a new identity for the practice of design in management work. The strategy to organise these new roles into teams and position them across the organisation focussed on distributing design capability and localising the application of the design theory and methods. These design teams and spaces were created in ATO business lines. This feature of organisation design has made the practices permanent in the ATO. The people who are designers are recognised for their skills and ability to perform the design theory and methods and permeate the organisation locations.

The third package comprised standardised mechanisms to engage others in the management and the practices of design. It presents important ways to keep the dialogue about design alive across the organisation. The first type includes standard forums for different tiers of the organisation to meet and discuss design. The second type of forum brings the outside taxpayer into the dialogue with the organisation through community consultation forums. These commitments enrol and subscribe members for periodic engagement and seek to maintain a user-centred approach to management work.

These packages have been intentionally enacted to embed design. The difficulty of achieving a sense of norm in institutionalising changed patterns of working was achieved through these standardised packages because they helped to translate knowledge of managing by design across the ATO and its teams, people, work, the community and the government. These packages shed some light on what it takes to make managing by design stick in a complex bureaucratic organisation. The three packages described could be considered collective efforts to adopt and adapt design into the management practices of the ATO. The constant involvement of many actors in the enrolment of other actors from within the ATO and outside of the ATO (business community members, tax professionals and other intermediaries) was achieved with the three packages.

EXAMPLE STABILSING DEVICE: COMMUNITIES OF PRACTICE

The creation of roles and different groups of designers which are located across many different business units was drawn as a powerful network of human actors in the organisation. The

recognition very early on that whilst the design roles would formally locate and be accounted for by different business areas the relationships between these areas should be considered connected and interact on a regular basis. The organisation supported and provided space for different communities to gather and interact, to share practices, and to explore real project challenges in light of enacting managing by design. These communities of practices are driven by middle management and all levels of designers are encouraged to attend.

CONLUSIONS

The sociology of translation applied to the organisational setting to understand the tenuous and delicate process of embedding design into management practice is a powerful and helpful framework for analysis. This paper set out to discourage simplistic views of change, and that multiplicity and complexity needs to be embraced. The position proposed follows the Actor Network Theory scholars in the field of science and technology studies, which along with other scholars such as complexity theory scholars for organisational studies, debunk claims of heroism or simplistic accounts of adopting innovations. In many ways managing by design can be considered an innovation. To more fully and accurately describe how it has embedded into the ATO the paper set out to trace and take into account all of the elements involved – the idea of design, the design process, the human actors, the design problems, the locations of action and the materiality of design. The emphasis should be placed on the creation and sustaining of networks through strategies pertinent to the organisation which aim to persuade, enrol and maintain support. The network acts as a means for translating design and moving it through the organisation and its work. The intentional and continuous effort to ‘translate’ design in practice has been presented in this paper.

The initial conditions, or case for design, can be viewed at a point in time as well as multiple points in time, and this is driven by the tactics and strategies to persuade and enrol which are carried out by multiple actors – both human and non-human. The identification of distinct case building and devices to persuade help situate the understanding of the many relations between different actors – the human: Design champions, senior leadership, designers, academics, consultants, taxpayers, through to the non-human: the design theory and methods, the practices, the representations, the staging of events. This paper contributes to the understanding that when embedding design in organisations attention should be paid to the messiness of all of these elements and to counter tendencies to reduce explanations of innovation or innovation adoption to a handful of pre-specified variables. This story of change through actor network theory is not a story of evolution. Rather it illustrates the intentionality and ongoing work that has been undertaken for design to be embedded in its management work.

This paper contributes to an understanding of the way large traditional bureaucratic organisations can shift towards a more open and participatory way of identifying themselves and engaging with their constituents. The implications for theory and practice are two fold: firstly how design can inspire change and facilitate organisational change. Secondly how organisations can practically evolve to develop organisational capacity and capability to do design in its every day work.

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LEADING
INNOVATION
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Warwick, L., Young, R. and Lievesley, M. (2012). *A Third Way for the Third Sector: Generating A Framework to Recognise the Impact(S) of the Co-Design of Service Innovation in Third Sector Organisations Using a Critical Design Research Cycle.*

A THIRD WAY FOR THE THIRD SECTOR: GENERATING A FRAMEWORK TO RECOGNISE THE IMPACT(S) OF THE CO-DESIGN OF SERVICE INNOVATION IN THIRD SECTOR ORGANISATIONS USING A CRITICAL DESIGN RESEARCH CYCLE.

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This paper describes work within early cycles of a doctoral programme of critical design action research. It synthesises themes in transformational practice literature with themes emerging from primary research following a service development programme in a VCS organisation. This is presented as a tentative framework of design activities to affect transformational change in a VCS organisational context.

Keywords: Service Design; third-sector, approach framework

CONTEXT

Over the past twenty years there has been a significant shift in the Voluntary Community Sector[d] (VCS) landscape in the United Kingdom, 'from grant aid[e] supporting charities… to them being contracted to do that work on behalf of statutory organisations' (Bruce, 2011). The resulting reliance on public capital has led to the sector finding itself in a fragile state following the significant contraction of state funding (New Philanthropy Capital, 2010). The volatile fiscal climate has had a considerable impact on VCS organisations' capacity, yet the third sector community is also trying to respond to a sizeable increase in service demand (VONNE, 2011). In such dynamic conditions, it remains unclear if the sector has the capacity to innovate at pace to accurately respond to the needs of their client groups (New Philanthropy Capital, 2010).

In the emergent fields of service design and social innovation practices with organisations, the focus of application has primarily been in the public sector (Parker, 2010) where design has helped to 'increase productivity, improve service quality and meet customer expectations' (Runcie, 2010).

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[d] The Voluntary Community Sector comprises of organisations that are not-for-profit and non-governmental. This sector is also called the third sector, in reference to the public sector and the private sector.
[e] *A grant is an outright gift of cash, but it is given on condition that agreed criteria, particularly purposes and objectives, are met.*

The open-ended nature of design as an inquiry lends itself to the consideration of problems in a social context. These 'wicked problems' (Rittel and Webber, 1973:60; Buchanan, 1992:16) are considered to be dynamic, changeable, and constructed by people, as much as they affect people. Contemporary design practice suggests therefore, that design should move from designing *for* people, to designing *with* people (Brown, 2009; Sanders and Stappers, 2008:7; Blyth and Kimbell, 2011), and provide the tools and support to help them think in a 'designerly way' (Sanders and Stappers, 2008; Brown, 2009; Thackara, 2010). Thinking in this way has been said to bridge the gap between deductive and inductive thinking; using abductive reasoning to consider what could be (Martin, 2009). Design Thinking and it's abductive reasoning has therefore been termed the 'third way' (Brown, 2009:4).

Despite a growing body of consensus, the value of this 'third way' to VCS organisations remains the least discussed in design literature, where the link between the theory and practice of designing is generally regarded as nascent. Research exploring the nature of design practice in this context, particularly in relation to the co-design of services is embryonic. Therefore, there is a great need to map, model and understand the effectiveness of design thinking, approaches and practices that are now being applied.

INTRODUCTION

This paper presents a valuable VCS case study, based on a recent two-year Knowledge Transfer Partnership[*] (KTP) project involving a service co-design programme undertaken by the authors with Age UK Newcastle[†], a charity providing support for older people, and Northumbria University, both based in the North of England. This case study forms the basis of an on-going doctoral programme to find out if question-framing through design thinking can better connect the practice of service delivery with organisational policy in VCS organisations.

LITERATURE REVIEW

In order to understand the role and relevance of design applied in a VCS context, this focused review draws extensively on several bodies of literature, including Design Thinking, Transformational Design and Service Design, and also touches on Organisational Change and Design Management discourse.

SERVICE AND DESIGN

As early as the 1980s it was suggested that a service could be designed intentionally (Shostack 1982) however, it is only in the last decade that we have witnessed the development of a profession of Service Designers (Kimbell, 2011).

Much of service design research has been dedicated to defining the field; articulating and proving why design could and should work on services (Sangiorgi, 2011; Wetter-Edman, 2011). Recent publications such as *Touchpoint* journals, *Design for Services* (Meroni and Sangiorgi, 2011) and *Managing Service Operations: Design and Implementation* (Hollins and Shinkins, 2006) have provided useful insights into the methods and tools designers use when operating in a service context. However, there is a still an absence of theory into what is involved in designing services, and indeed, the extent to which it can be designed (Meroni and Sangiorgi, 2011).

Developments in service marketing and management theory have however improved our understanding of service, and the aspects of it that can be designed. The foundational premises of what Vargo and Lusch (2004) named Service-Dominant logic present service as dynamic, within which value is co-created by actors, as opposed to goods dominant logic, where the value is destroyed when consumed. Consequently, the user is a co-creator of the value of a service,

[f] Knowledge Transfer Partnerships are a research based form of technology and innovation support for industry, public and VCS organisations by the UK Government's Technology Strategy Board

[g] Age UK Newcastle is a local charity, part of a national federation, that enhances the status and wellbeing of older people in Newcastle-upon-Tyne

determining the value of the process at the moment of use: 'value-in-use' (Vargo and Lusch, 2008; Sangiorgi, 2011; Wetter-Edman, 2011). A service can therefore be thought of as both social and material, as the tangible goods create 'value-in-use', whilst the interaction between service and user remains intangible (Kimbell, 2011:15).

Viewing services as complex and relational entities that remain indeterminate therefore suggests that they cannot be fully designed (Sangiorgi, 2011). As a result, Kimbell (2011:49) proposes that the profession no longer consider themselves 'service designers', but instead talk about 'designing for service', as the term recognises that what is being designed is not an end result, but rather a platform for action with which diverse actors will engage over time. Services are therefore platforms for wider societal transformation, and are discussed increasingly in terms of inciting transformations on personal, Organisational and societal levels (Burns, et al., 2006; Manzini, 2011).

DESIGNING FOR TRANSFORMATIONAL CHANGE

The transformational potential of services themselves stems from their entrenched and dispersed positions in social systems, thus having the potential to impact individuals, families and communities by suggesting and encouraging new behaviours (Ostrom, et al., 2010). However, it is only in more modern design discourse that the transformative powers of service design have been formerly recognised, with literature exploring design's role in inciting change in both organisations (Junginger, 2006; Bate and Robert, 2007; Junginger and Sangiorgi, 2009) and communities (Thackara, 2007; Blyth and Kimbell, 2011). It has also been reported that service design is being increasingly used in the development of policies to "address societal challenges and as a catalyst of societal and economic change" (European Commission, 2009, p. 70), suggesting that transformational powers of design are being utilised on a national and international stage.

In 2006, Burns, et al. defined this area of design practice as a separate discipline; transformation design. They cite that the new challenges and contexts that designers work in and on calls for a new approach, and that should be distinctive from existing practice (Burns, et al. 2006). Similarly, Sangiorgi (2011) remarks that the relative youth of this area of practice means that there is little theory on how designers can affect change on an organisational or societal level. To this end, Pacenti and Sangiorgi (2010) identified transformation as one of three main research areas for the development of the service design discipline.

Although still an underdeveloped area in design research, the links between design and organisational change have been more extensively examined. Junginger's (2006) doctoral enquiry first interrogated the role of design for organisational change, suggesting a link between human-centred design and organisational learning (Junginger, 2006). Service Designs holistic and strategic nature means it operates at an embedded level in the organisational system (Junginger and Sangiorgi, 2009; Kimbell, 2011), therefore, the service design community need to understand the nuances of organisational change in order to be fully aware of their actions and impact (Junginger and Sangiorgi, 2009).

The following section outlines themes that exist in texts that discuss transformational change in organisations or communities, in order to understand the features of transformational design as they are currently understood.

THEMES IN TRANSFORMATIONAL CHANGE LITERATURE

As a result of Wetter-Edman's (2011) recent review of service design practice as described in design, management and service marketing writing, she produced a framework that described the five key characteristics found across the literature. The three questions by which she framed this review are also appropriate to this enquiry, i.e.: who designs; how is it designed; and what is designed?

QUESTION 1 - WHO IS INVOLVED IN DESIGN FOR TRANSFORMATIONAL CHANGE?

In answer to this question, Wetter-Edman (2011) found that the discourse on Service Design practice indicated it should be interdisciplinary. Non-designers within organisations or communities should be given the role of designing and delivering the service development, thus the teams themselves should be cross-disciplinary (Burns, et al., 2006:20; Thackara, 2007; Brown, 2009; Wetter-Edman, 2011).

In a social context, this type of activity has been termed ‘social innovation’, whereby individuals or communities begin to act together to address an issue (Manzini, 2011). In 2011, Sangiorgi identified seven key principles that were common across transformative practices. One, ‘intervention at a community level’, implied that members of the community should become empowered to participate in the definition and development of their own solutions (Sangiorgi, 2011:33).

Burns, et al., (2006:20) pointed to the complexity of social problems as a need to involve a range of people affected by the project, or whose knowledge base can contribute to the understanding of the problem space. As design activity is increasingly undertaken outside of the traditional boundaries of the field, the need to involve ‘experts’, be it of their locality or profession, becomes even more important (Thackara, 2007; Blyth and Kimbell, 2011; Manzini, 2011).

QUESTION 2 - HOW ARE TRANSFORMATIONS DESIGNED?

This literature asks what themes arise in the discussion of how change occurs and in particular, what approaches, tools and methods are applied to incite change?

PARTICIPATION

In organisational change theory, it is suggested that the organisational learning required to change behaviours cannot happen without a deep psychological engagement among stakeholders (Chapman, 2002). Junginger (2006) suggests that as organisational learning needs to be the main output of a designer’s engagement, this cannot be achieved without active involvement in the process itself. To generate such interest and commitment requires building trust in the design process (Junginger and Sangiorgi, 2009) and this is best demonstrated by actively involving the stakeholders in all aspects of the process; undertaking true co-creation, not just collaboration (Sanders and Stappers, 2008; Meroni and Sangiorgi, 2011). In her summary of transformative practices principles, Sangiorgi (2011:33) summarises this as the engagement of ‘active citizens’.

Burns, et al.’s (2006:20) third characteristic of a transformation design project is ‘employing participatory design techniques’. They suggest that designers should use techniques that make the design process accessible to ‘non-designers’ (Burns, et al., 2006:20). A designer’s role, therefore, becomes that of a facilitator, where they endeavour is to ‘balance complex stakeholders’ requests but also create embodied solutions to meet their needs’ (Han, 2010:4).

FACILITATION

Wetter-Edman’s (2011) summary of Service Design practice touches on facilitation as a key theme of the literature. However, her framework does not distinguish it as a separate activity, seeing it as part of adopting a participatory approach. Many other authors, however, distinguish facilitation not as a characteristic of an approach, but a role that can be adopted by the designer in many contexts (Han, 2010; Kimbell, 2011; Tan, 2012).

In this role as facilitator, one of the designer’s key objectives is to generate new knowledge on a shared basis for these stakeholders. (Han, 2010; Tan, 2012). The service designer becomes an ‘essential change agent’ who helps the stakeholders to participate fully in the design process, constructing understanding that enables them to act on this new knowledge (Han, 2010:9).

Studies of service designers in practice have demonstrated this central role that designers often have to adopt in order for an existing team to think in a radical way (Burns, et al., 2006; Kimbell, 2011; Tan, 2012) As designers begin to operate increasingly in community contexts, they will have

to adopt this position as facilitator of the design process more and more, in order to put the power of change in the hands of those it affects (Manzini, 2011).

REFRAMING

An important aspect of enabling non-designers to undertake a design process is helping them to consider an issue holistically in order to correctly frame the problem.

English (2006) suggests that innovation is a result of understanding what is possible. With 'wicked problems', the issues are complex and dynamic, meaning organisations have little understanding of what the outcome could be (Rittel and Webber, 1973:60; Buchanan, 1992:16). Whereas designers traditionally were brought in to respond to a given brief, in trying to incite change, designers are now involved in constructing the understanding of the problem, and thus the brief itself (Burns, et al., 2006; Blyth and Kimbell, 2011). In organisational change literature, Chapman (2002:24) points to stakeholders being able to 'reframe' issues as an outcome that leads to fundamental change in an organisation's practice. The first characteristic of a transformation design project is therefore 'defining and redefining the brief' (Burns, et al., 2006:20).

VISUALISATION AND PROTOTYPING

One of the core competencies visible across the design profession is an ability to use and manipulate visuals and form. Whilst in traditional design practices this has been focused on the form of products and artefacts, in the context of service design, visuals and prototypes are considered tools for communication; the development of ideas; and presenting information during the design process (Wetter-Edman, 2011).

Han (2010) remarks that working on touchpoints of a service can help to initiate stakeholder learning by moving an idea from concept, towards reality. In creating visuals and physical objects, however refined, designers create more opportunities for people to interpret and discuss an idea, and improve their understanding of a social issue (Blyth and Kimbell, 2011). Service design practice draws on six commonly used visualisation techniques; blueprinting, customer journey, desktop walkthrough, persona, storyboard and system map (Segelström, 2010). However, prototyping a service is often more challenging due to the temporal and situated nature of services in general (Wetter-Edman, 2011).

QUESTION 3 - WHAT IS DESIGNED?:

After considering *how* the transformations are designed, it is appropriate to look at what literature tells us are the outcomes of this engagement.

DESIGN OUTCOMES

Traditionally, spaces, products or interactions, are the outcomes of a design process. Design practice creates objects that not only 'satisfy functions or solve problems, but are also desirable, aspirational, compelling and delightful' (Burns, et al., 2006:9). In a transformational context, such objects are a means of transforming the way in which organisations connect to individuals (Burns, et al., 2006).

Junginger and Sangiorgi (2009:4345) state that the core of Service Design practice is to distinguish between designing 'interactions' (user - device interface) and designing 'service interactions' or 'encounters' (user – service interface). Designing a service interaction or encounter therefore results in a different type of design outcome than is seen in the design of singular interactions or products.

Kimbell's (2011) paper on a way of viewing service design practice, found that the aim of the designer's engagement was to 'create and develop proposals for new kinds of value relations within a socio-material world' (Kimbell, 2011:49). Her understanding builds on service-dominant logic theory that suggests that service is a value exchange (Vargo and Lusch, 2004). As services cannot be fully designed (Sangiorgi, 2011; Kimbell, 2011), design outcomes then breakaway from

the design object of traditional disciplines. A characteristic of transformation design is instead the presence of non-traditional design outcomes; ‘transformation designers are just as likely to find themselves shaping a job description as shaping a new product’ (Burns, et al., 2006:21). Non-traditional design outcomes supports the view that services designers are now focusing on value creation as a design outcome, in whatever form that might take (Wetter-Edman, 2011; Kimbell, 2011)

TRANSFORMATION

An outcome of transformational design is of course, some type of transformation, and the literature debates what constitutes a ‘transformational change’.

In organisational change discourse, Golembiewski (1979) suggested that there were three categories of change, conceptually described as alpha, beta and gamma change. Alpha change referred to an alteration in stakeholder activities and beta depicted a difference in the standard of behaviours, but both changes occurred within existing system boundaries in an organisation. Gamma described a fundamental shift in the way that an organisation’s work and purpose was understood (Golembiewski, 1979).

Levy’s (1986) model of organisational change, based on Watzlawick et al’s. (1974) earlier depiction, showed two levels of change; first-order change indicated incremental adjustments to the existing systems, while second-order involved changes to the systems themselves. It is the latter that is now commonly accepted as transformational change (Chapman, 2002).

Using Levy’s (1986) model of second-order change, Sangiorgi (2011) relates the stages in achieving fundamental, or a paradigm change, to service design outcomes (see Figure 1). She purports that for Service Design to be used in a transformational way, a design team cannot just produce design interventions, but must seek to challenge fundamentals of an organisation’s behaviour (Sangiorgi, 2011). A designer must therefore uncover and question core assumptions and organisational standpoints to action fundamental change (Junginger and Sangiorgi, 2009). Wetter-Edman’s (2011:69) summary also makes the distinction between service-level and strategic-level change in her framework categories of ‘Value Creation’ and ‘Transformation’.

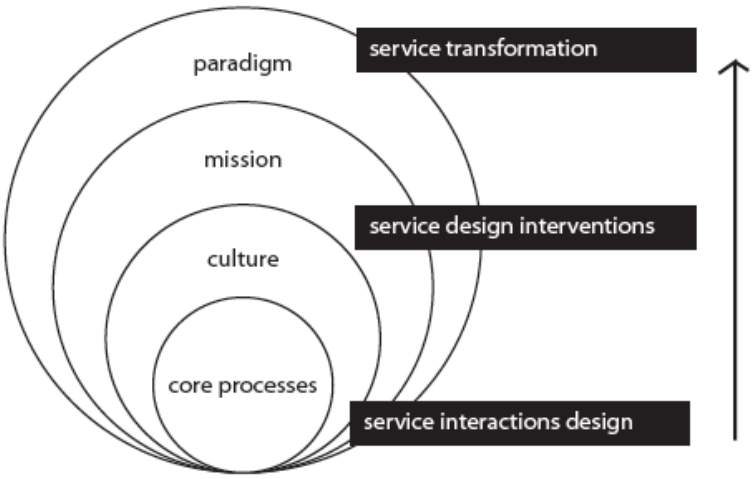

Figure 1 Levels of change within service design
Source: Sangiorgi, D. (2011)

It is therefore appropriate to consider what indicates that a transformational change has occurred.

AWARENESS

Organisational change discourse suggests that a marker of transformational change is a discernible difference in the way stakeholders think and behave (Chapman, 2002; Sangiorgi, 2011). Whilst reframing can be viewed as a design method employed to bring about change, the ability for stakeholders to then do this for themselves is seen as an indicator of gamma change (Levy, 1986; Junginger and Sangiorgi, 2009; Sangiorgi, 2011).

In design literature, it is the human-centered perspective that designers bring to a project that can affect this change (Junginger, 2006; Blyth and Kimbell, 2011; Kimbell, 2011) Junginger (2006) purports that the participatory approach, coupled with the designer's method of reframing, can serve as a platform for organisational change that repositions an organisation's relationships with its customers at the centre. This transformation can be viewed as one that shifts the organisation from a business-as-usual culture into one that is more responsive to the changing needs and demands of the customer groups (Brown, 2009)

A COMMUNITY

In successfully demonstrating a new perspective with which to view established problems, a designer effectively creates advocates for the benefits of this new lens (Thackara, 2007; Brown, 2009).

Amongst organisational change discourse there is evidence to suggest that stakeholder participation is a desired outcome from a period of engagement (Chapman, 2002). Transformation, like service, is perpetual and indeterminate therefore a community of advocates is needed to continue to realise the change (Wetter-Edman, 2011). A designer's role should be to facilitate the formation of a community and empower advocates to apply this approach to other contexts within their remit (Han, 2010; Manzini, 2011). Han (2010), describes this as a 'Community of Service', and suggests that it is an intangible but essential outcome of Service Design practice, as it is this community that will deliver and consume the resulting change after the designers engagement ends (Han, 2010:10).

Furthermore, it is suggested that the engagement should focus on creating a community, not just of advocates, but also of designers, in order to continually affect this change (Han, 2010; Manzini, 2011).

BUILDING CAPACITY

The fourth distinguishing characteristic of Transformation Design is described as 'building capacity, not dependency' (Burns, et al., 2006:21). A designer's role is to create a means of continually responding, adapting and innovating (Burns, et al., 2006) suggesting that building capacity is elemental in generating lasting legacy in transformative design (Sangiorgi, 2011).

Much research suggests that this requires a further shift in designer's practice, and that they must go beyond the idea of designing service solutions with stakeholders, and view themselves as capability builders (Burns, et al., 2006; Manzini, 2011; Tan, 2012). In her model of transformational principles (see Figure 2), Sangiorgi (2011) suggests that building this capacity should be the first step in a designer's work, to engage them in tools and methods that help them to deal with complex issues and changing contexts as part of daily activity. Han (2010) on the other hand, suggests that capacity building happens as a by-product of the participatory approach, and knowledge is gained throughout the design process.

Figure 2 Transformational Principles
Source: Sangiorgi, D. (2011)

ORGANISATIONAL STANDARDS

Burns, et al. (2006) suggest that the final characteristic of a transformation design project is that they aim to challenge and transform community or organisation's culture.

A designer must not only create a community of designers with a new, shared way of thinking, but also co-create with this community a new vision for the organisation (Junginger and Sangiorgi, 2009). A designer's ability to create strategic vision is much documented, with designs holistic, customer-centred approach helping to unite disparate pieces of information into a single, unified plan (Han, 2010; Blyth and Kimbell, 2011; Tan, 2012). In a transformational context therefore, a designer must not only help to create this vision, but also aim to unite stakeholders around this shared worldview (Junginger and Sangiorgi, 2009; Han, 2010; Tan, 2012).

CONCLUSIONS

The literature review concluded that the themes in transformational practice literature are the best representation of who is involved in designing change, how it is brought about, its outcomes and what constitutes a transformational change. Although these are unifying themes, there is still no theory as to which principles are most important when inciting transformational change in different contexts.

The themes and distinctions focused on in this review are used below to analyse the outcomes of a two-year design engagement in order to form a tentative approach framework for transformational change in a VCS organisation context.

METHODOLOGY

A *Research Through Practice* methodology underpins our approach, where 'designers are directly involved in establishing connections and shaping their research object' (Jonas, 2007:191). This approach elicits a greater level of understanding of current design practice, and enables a thorough interrogation of the framework in relation to its application.

Current studies within the Third Sector have been largely quantitative, or studies of macro-economic and political factors that effect VCS organisations as a whole, most recently focusing on the impact of the economic recession. There is little information about the micro realities, in particular the relationship between service delivery practice and organisational policy, or the

relationship between descriptive data (theory) and the service praxiology (practice). Therefore, this research investigation is primarily exploratory, in order for theory to arise from the analysis of the data. It also gathers qualitative data in order to derive understanding about an area in which we are unable to control all factors.

In order to respond to theory as it emerges from practice, the research was designed to be flexible yet rigorous. The combination of research methods included a *literature review* (Hart, 2001) that captured key themes relating to; Design Thinking, Organisational Change, Transformational Design and Service Design, a *case-study review* (Yin, 2003) including semi-structured interviews with Age UK Newcastle project stakeholders to capture the; methods and approaches, outcomes and legacy of this service design programme and *Action Research* (McNiff and Whitehead, 2006), supported by *reflection-on-practice* documentation (Schön, 1983).

The hybrid methodology is based on reflection on the experiential knowledge derived from a specific case study of co-design practice with Age UK Newcastle, delivered by the authors as a Knowledge Transfer Partnership project with Northumbria University.

The critical review of literature found themes and process model aspects that most closely relate to the co-design case-study, most specifically in Transformation Design.

Semi-structured interviews (Robson, 1993) were conducted, in order to draw out knowledge through the experiences of project stakeholders to compare and contrast with the literature review. The questions were designed to capture data that would correlate to the key themes derived from the literature review. The choice of semi-structured interviews (Robson, 1993) ensured a more natural interview style, as the interviewer was able to vary the sequence of the questions to respond to the conversation, but the questions remained consistent across all interviews (Bryman, 2003:543). A semi-structured interview approach also suited the exploratory nature of the qualitative research.

The KTP programme involved two main pieces of work, and interviewees were chosen so that there were at least two people who had been on the co-design team for each project to allow different perspectives to inform the findings. Equally, participants were chosen from all levels of the organisation, including two participants no longer working for Age UK Newcastle, which allowed the authors to understand how the design approach had affected their role in other VCS contexts. This objectivity also helped to elicit more reflective accounts. Similarly, participants were informed of the research purpose, and their anonymity was ensured to encourage full, honest explanations that can be considered reliable data. All participants could comment knowledgably, with each having between 5 and 20 years experience of incrementally developing services without design.

Figurative language in interviewee responses were coded manually to allow for quotes, phrases and/or words with a common meaning to be grouped together (Tan, 2012:79). Manual coding of figurative language allowed the authors to group responses by meaning and them into multiple coding collections (Tan, 2012:79).

The findings from these interviews were subsequently correlated with the themes derived from the literature review, and aspects from existing process models used in public and private sector contexts. The process highlighted the specific challenges of working in the VCS area.

FINDINGS

Findings, discussed below, have been organised in relation to the themes that arose from the literature review:

WHO (TEAM)

The findings indicate that interdisciplinary teams remain a key part of design projects in this context. Although none of the interviewees mentioned the term ‘interdisciplinary’, or ‘cross-discipline’ within their responses, the very fact that all were common members of at least one

design project, yet sat in different departments, shows that the designer did establish interdisciplinary teams.

Person T mentioned that when developing a new Befriending service, staff from outside the department were asked to rate the generated ideas, and then went on to use some of these ideas in their own departments. Person C and M mentioned engaging front-line staff in design activities as being a breakthrough moment in helping to move the organisation from being reactive, to more responsive.

The literature also acknowledged that an interdisciplinary team has to be facilitated (Han, 2010; Tan, 2012). Person C felt the designer's key role was that of facilitator. Other participants felt that having the designer as the facilitator in the team helped people to engage in the process and put trust in the work.

HOW (TOOLS)

Participatory tools, which feature heavily in transformational discourse, are also a prominent feature in the interview analysis. Few interviewees mentioned specific tools but felt those used had been non-threatening, visual, engaging and empowering and their participatory nature was key to success of the programme.

Only one participant used the term 'prototyping', referring to the pilot of a new service, however they did not say that this was a feature of the design process, instead referring to it as an outcome of the engagement. However, all participants felt that visualisation was core to the design approach, which may just be an indicator of the types of projects the designer worked on.

Three out of four participants referred to a video made of older people's experiences of a service as an example of visualisation. One interviewee said the video 'gave a much richer picture… it brought it to life rather than just as words'. They went on to say that the designer was instrumental in ensuring the insights were captured visually and they would not have attempted to record it this way without their involvement. Person C implied that the distinction between design and other disciplines was using visuals 'all the time', from recording to communication.

In the literature review, the method of reframing appears prominently, as in the participant interviews, where the tool is described as removing the barriers to thinking to allow them to accept and interrogate new possibilities.

HOW (APPROACH)

Involving stakeholders in defining, designing and delivering a solution was a key tenet of the transformational practice discourse (Burns, et al., 2006; Sangiorgi, 2011). The importance of a co-design approach also arose from the interviews; all participants said that being involved throughout a project helped them to understand the needs, and feel empowered to make a change. Person T said that they felt that the new concept for the Befriending service occurred 'naturally' out of the information gathered in the process; reinforcing the idea that participation improves understanding (Burns, et al., 2006; Thackara, 2007; Meroni and Sangiorgi, 2011). Likewise, other participants said they felt that involving people at every stage of the process helped the final idea gain momentum and permission.

Although co-design was an overarching theme to the designer's approach, there were other aspects of the practice that the participants felt were of particular value.

PROVIDE A RIGOROUS VEHICLE FOR INQUIRY

Whilst the review of design literature pointed to design as an inquiry (Rittel and Webber, 1973; Buchanan, 1992), there was little mention in transformational literature of presenting the value of design in such a way.

In the interviews, it was suggested that design had provided the organisation with a vehicle with which to explore the issue in a thorough way. Although it could be argued that without service design, the project would have been quicker, person T felt that the rigour of the approach ensured

it was a ‘fruitful’ investigation. Person C said that whilst the approach helped you to open your mind to a huge number of possibilities, it was the underpinning precision that helped you to determine what was valuable, and what wasn’t.

It was also suggested that people within the organisation are often asked informally to carry out pieces of ‘service design’ but are never given an approach to do this properly, which results in outcomes that have little impact. Similarly, person G said, whilst the organisation recognised they needed to do things differently; they did not know how to go about that until the design process was introduced. They also said that this was a symptom of the sector as a whole.

LIBERATE CREATIVITY

Interviewees did not distinguish between the methods used, rather continually referring to the whole design process as ‘creative’ or ‘fresh’. They made reference to ‘blue-sky thinking’, ‘reframing problems’, and starting with ‘a blank-slate’ as part of helping to liberate their creativity. Person T felt that it was a creative approach that helped the team to develop a different service proposition for the Befriending recipients.

The fact that the respondents talked so vehemently about a creative approach shows its importance to the success of the programme. Respondents all stated that it was this different perspective that could help organisations survive during this difficult operating context for the sector. They discussed that traditional approaches encourage you to plan within resources, whereas service design asked them to be more aspirational, looking at ways to achieve the ideal. Person T and C commented; this had a knock-on effect on the way research was conducted and meant the team took a more holistic approach to questions they asked and this altered the type of data gathered.

CONSTRUCT AND COMMUNICATE MEANING

The transformational literature talked about methods of communication, such as visualisation and prototyping (Wetter-Edman, 2011). It also talked about the role of the designer; helping organisations to view issues from different perspectives (Thackara, 2007; Brown, 2009). However, the two remain discrete themes not yet discussed in terms of assisting stakeholders to elicit information then understand, translate and communicate it.

In the interviews, participants described the value of design practice as doing just this; Person M described the designer’s way of analysing information as something that they would not have thought to do, and that the approach ‘got under the skin of things’, and resulted in new insights. Person T implied the designer’s role in helping to ‘process information’ was key to helping understand and translate data into useable knowledge. Also, participants said that service design practice gave them a ‘framework …to actually work with the information we’d got’ throughout the development process.

WHAT (OUTCOMES)

VALUE CREATION

The three interviewees who worked on the development of the Befriending service stated the involvement of design was key to producing the service. One felt it was infinitely better than if it was produced in a different way. Person T said they felt it might have involved telephones in some way and would have taken a more traditional format.

These design outcomes were described in value-creation terms (Kimbell, 2011; Wetter-Edman, 2011), and related entirely to the customer interaction level of service design interventions as described by Sangiorgi (2011).

TRANSFORMATION

The type of transformation varied depending on the perception of the interviewee, but all reported change on a personal level.

When asked about the outcomes of taking a design approach, the most prominent theme in the responses was the concept of ‘thinking differently’, linking closely with the awareness theme that arose from the review of literature. Two interviewees have since moved to other VCS organisations and both say they have continued to use their new creative mindset in these positions, particularly questioning the foundation of claims and thinking about working towards the ideal version of a service or product. Similarly, Person C says they have adopted some of the visual processes advocated by the designer into their everyday work.

There is evidence of a community of advocates (Han, 2010; Manzini, 2011) as one participant also says; they have advocated the design approach to two other project groups operating in the VCS community and that has led to them engaging with the design process. Person M also talks about taking an active role in explaining the design process to other staff. Similarly, all participants demonstrated that they recognise where a different perspective needs to be taken, for example, person C said they realised when one group of people were planning to research, but already had the solution in mind.

Some also felt there had been change at an organisational level in relation to policy and processes. Person T points to the fact that service design has been adopted as a model of practice within the organisation, as an indicator of the programme’s impact. Person G said they felt the organisation worked ‘through change by changing the people that were at the heart of the organisation’.

WHEN (VCS ORGANISATIONAL CONTEXT)

Whilst the findings suggest that transformational change might have been achieved in this programme, the level of organisational engagement was seen to be a key factor in whether or not this occurred. There were three key themes to this that arose from the interview analysis.

DESIRE TO CHANGE

The literature review stated that an organisation needed to be challenged at a fundamental level, but current design practice does not explicitly mention the effect that organisational context can have on a project. Interview respondents said that the success or failure of change was often down to whether the entire organisation embraced this change. One participant said they felt that even though a designer had been invited to work with the organisation, some of the management did not have the required desire to do things differently.

PERMISSION TO CHANGE

Person M stated that without the right organisational structure in place; ‘flourishing ideas’ are not captured or allowed to develop. Particularly when discussing radical ideas, respondents felt the organisation had to be prepared to take risks and whilst that might feel uncomfortable, it was seen as a positive type of disruption.

In organisational discourse, Rousseau states that organisations can either drift, accommodate or engage in a radical transformation (Rousseau, 1995). Junginger and Sangiorgi (2009) also comment that in a service design practice context, it is common for a project to start at the ‘peripheral’ of the company or community and shift towards a strategic level over time. They purport that pilot projects, in a similar way to prototypes in a design process, help designers to move from first-order involvement, to a second-order position of influence (Junginger and Sangiorgi, 2009). Participants also suggested this was true, saying that the Befriending service provided a real example of how design could create services of value, and a process for other stakeholders to emulate.

CAPACITY TO CHANGE

Although the new Befriending service model was adopted by the organisation, some of the interviewees said that the operational change occurring simultaneously made it difficult for it to have a higher level of impact. Person C and G stated that the changing operating context was an unfortunate consequence in the VCS sector. Respondents also said that engaging in the approach required organisational capacity because of the time-intensive, participatory nature of the design process.

Person M mentioned the difficulty in controlling a project and maintaining morale when issues like funding came into question. As a result of the organisational restructure happening at the same time as the designer's work, much of the knowledge left the organisation. This indicates the importance of a stable working context so that knowledge has the opportunity to transcend the personal, to strategic levels, ensuring transformational change. Similarly, person C stated that Service Design became lost in the context of bigger issues and is now 'sort of re-emerging in a different way'.

CONCLUSIONS

In this case study, service co-design acted as a catalyst for value creation and the potential for long-term personal and organisational behaviour transformation. The legacy of the outcomes appears to be influenced by a range of contextual factors, including the organisational operating context.

Building on the main themes derived from transformational practice literature, it is possible to identify both key methods and outcomes that help to identify organisational change, and approaches that a designer should advocate in order to achieve this change.

Organisational context factors are absent from many models, as many discuss co-design in a community (Sangiorgi, 2011), and not within the bounds of an organisation. Although the context is usually outside the designer's control, it is clearly a contributing factor to project success and should therefore be considered in an approach framework. This moves the themes of transformational practice forward so that a framework of approach can be suggested specific to a VCS context in Figure 3.

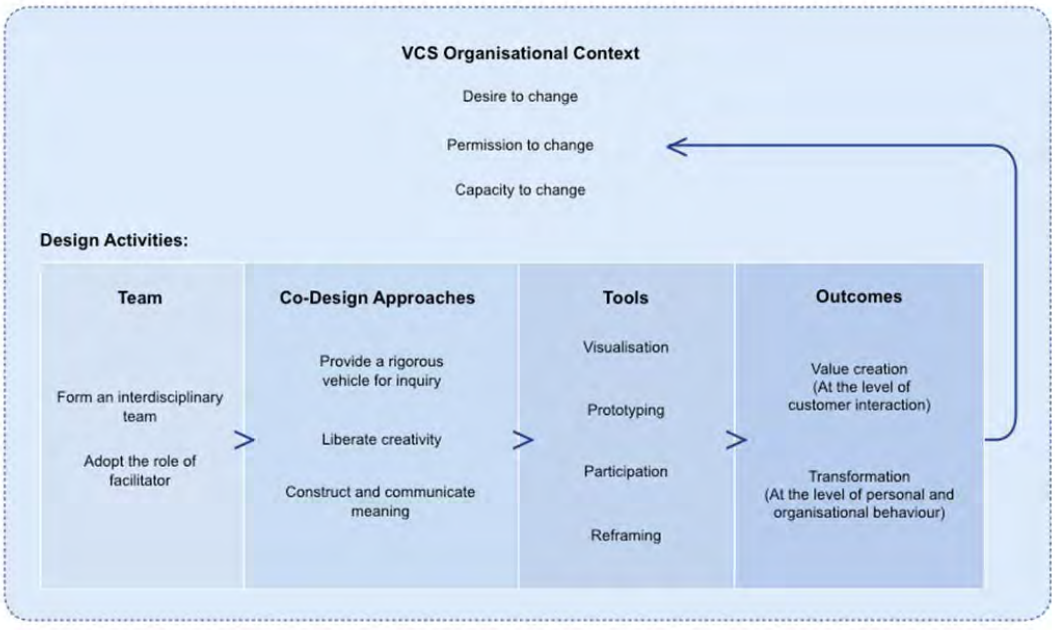

Figure 3 Design Activities for Transformational Change in a VCS Organisational Context

The tentative framework is split into two main sections: the design activities and the project context.

The design activities are described in four sections; team; approaches; tools; and outcomes. In the team section, the first aspect is ‘form an interdisciplinary team’; co-design groups were seen to involve representatives from all stakeholder groups affected by the project. The second aspect is ‘adopt the role of facilitator’, which describes the function of a designer within the team throughout this process. These two themes were key in both the review of the literature, and the interview analysis.

In the approaches section, there are three features, all of which come under a co-design theme. The first, ‘provide a rigorous vehicle for inquiry’, describes the value of the design process helping VCS stakeholders to *thoroughly* explore an issue and arrive at an appropriate solution. The second element, ‘liberating creativity’, is advocated because of the need for stakeholders to forget traditional processes and services, and transform the way they undertake each aspect of service development. Thirdly, the approach ‘construct and communicate meaning’ represents the need for the designer to work with stakeholders to enable them to gather data, interpret it and translate it into desirable systems, services and touchpoints.

In the tools section, ‘visualisation’ is the use of visual tools to capture, communicate and represent information. The second tool is ‘prototyping’; a means of testing an idea, or parts of an idea, to aid communication and development. The third tool is ‘participation’, which describes the need to use non-threatening, engaging tools to encourage stakeholders to contribute. Finally, ‘reframing’ as a method is listed, as it is important to help stakeholders to re-imagine a problem space or idea.

In the outcomes section, the first category is ‘value creation’, which describes changes on a customer-interaction level, whereas the second category, ‘transformation’, describes changes on a personal and organisational behaviour level. The themes described in the literature review that indicated a second-order change have been repositioned, in part, as approaches, in order to try and enact this change in this context.

The final section is context, which lies outside of the designer’s control and so is positioned in a bounded box. Firstly, ‘desire to change’, describes an organisation’s buy-in to a change process. The second aspect is ‘permission to change’, which relates to the organisation giving stakeholders permission to enact change. Finally ‘capacity to change’ is included so a designer is mindful of the general operating context for the organisation and the bearing that might have on the change they are trying to bring about.

The formation of the framework is such that it shows that contextual factors have an impact on the actions of the designer, but that the outcomes of the work can also have an influence on organisational permission and desire to change. Junginger and Sangiorgi (2009) suggest that pilot projects can play a fundamental role in shifting design from the periphery of the organisation to being in a position to action transformative changes.

The framework does not attempt to describe a time-frame for achieving transformational change, or an exact process for doing so, but merely advocates a series of stages, and in particular a series of co-design approaches, that have proved valuable in this context.

CONTRIBUTION TO KNOWLEDGE

The contribution of the research described in this paper to the field of service innovation through co-design practice, is to correlate the most congruent aspects of existing service design themes and process models from the literature to a context of practice of service development in a VCS organisation. This process of correlation is synthesised in the form of a tentative framework for design activities to affect transformational change in a VCS organisational context. The framework functions to assist the development and review of projects, rather than as a working model for delivery of co-design practice.

LIMITATIONS

The approach framework presented in Figure 3 has been described as tentative as it derived from reflection on one case study in a VCS context. It goes someway to clarifying what is valuable to a third sector organisation, but further work is needed to test the framework's relevance by exploring its applications in other similar contexts. Similarly, the qualitative approach adopted in this paper was appropriate for an exploratory study, but this limits how these findings might be generalised.

The ongoing aim of this research is therefore to develop, validate and refine this approach framework through the critical design action research process; conducting several co-design project case studies with VCS organisations. This refinement is expected to improve the relevance of the approach framework to an increasing range of VCS contexts and the themes and aspects on which it is based. It is anticipated that the resulting framework will add theoretical rigour to design praxis in this emerging area of service innovation in VCS organisations to become a process model for designers operating in this context.

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LOOKING AT DESIGN THINKING INTERVENTIONS AS ARTISTIC INTERVENTIONS

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ABSTRACT

Drawing on data from a case study of six projects where artists used their artistic competence as organizational change facilitators, this paper argues for a theoretical coupling of the discourse(s) of design thinking to research streams within art-and-management. The artistic dimension of design, the practice perspective and the artistic process should be considered if we are to understand the full potential of design thinking for companies. We propose that the artistic side of design should be acknowledged more within the design thinking discourse. Expanding the current framing of design thinking in the managerial context and insisting that design thinking interventions are led by practicing designers or artists will reinvigorate interest in the concept rather than dismissing it as just another management fad, accused of being of no lasting value.

Keywords: *Artistic intervention; Design thinking; Innovation*

INTRODUCTION

Imagine a dancer helping talented salespeople become more successful, or a magician who is also an actor being involved with governmental problem solving. These, and four other equally odd interventions lead to questions such as, “how?” “why?” or, “who cares?” and the links are neither ordinary nor "natural" for most of us. We describe six such projects and provide “answers” showing that artists do have something valuable to contribute to organizational innovation and change.

The paper begins by describing of the background of the project, the theoretical frame of reference and a short methodological statement. The empirical material follows, with descriptions of the six projects, detailing how and what the artists contributed to organizational development. In the analysis section we use our data to point to ways in which such interventions are similar to ones led by designers when we consider the designer’s process as individualized and contextualized. Finally, we draw conclusions and present contributions to theory and practice.

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THEORETICAL FRAME OF REFERENCE

Our theoretical framework is multidisciplinary in that our area of interest intersects design, art, and management/organization theory. Here we present relevant academic areas.

DESIGN AND DESIGNERLY THINKING

Design can be understood in different ways: as deliberate human creation to change reality into a preferred one (Simon 1996); as a reflective profession (Schön 1983); as the resulting artifacts, a design history perspective (Forty 1992), as an open process that is individual for every designer, yet with common characteristics (Cross 2011, Lawson 2006), or as the creation and re-creation of meaning (Krippendorff 1998, 2006, Verganti 2006, 2008). These academic discourse streams have different epistemologies and lead to different approaches to understanding design thinking (Johansson et al 2011): Simon's objective framework of problem formulation followed by solution finding; Schon's descriptions of ways designers reflect both during and after the designing process; Buchanan's (1992) consideration of the creativity needed to "solve" fundamentally indeterminate "wicked problems"; Lawson's and Cross's focus on the designer's specific awareness and abilities as "designerly ways of knowing", and Krippendorff and Veganti's assimilation of design thinking within meaning-making. Such distinctions highlight the most fundamental differences.

In this paper we consider design and designers' work as meaning-making, a perspective that draws attention away from the artifact as such, and directs it to the emotional relation – or sense-making – that occurs *between* the human being and objects of different kinds. The designer may still design artifacts, but the meanings other human beings bring to these artifacts are a vital part of the design process. Considering the designer as a meaning creator leads to regarding him or her from a hermeneutic perspective where meaning and interpretation are at the core (Alvesson & Sköldberg 2009, Ch.3). Unlike most hermeneutic perspectives, however, design is not only a matter of interpretation of something existing, but also active creating, a profession conducted in a workshop rather than taught only through books or lectures. It is a competence or knowledge-in-action (Dreyfus & Dreyfus 1980) rather than cognitive knowledge, and is therefore best understood through a practice perspective (Bourdieu 1977).

DESIGN MANAGEMENT AND MANAGEMENT-BASED DESIGN THINKING

Design management, relating to activities concerned with managing the design process within a company, was first concerned with the industrial design process (Farr 1966), then with the strategic role of design within the whole company (Cooper et al 2011), and most recently, with innovation (Kelley 2001, 2005). Academically, the subject became of interest in the late 1970s (Gorb 1990, www.dmi.org), and continued in tandem with design management practice. At first, practicing designers used traditional management concepts when trying to explain "design", but when the CEO of the world's largest design company, IDEO, introduced "design thinking" as "shorthand" for what designers do (Brown 2008, 2009), the concept and corresponding practices were embraced by managers, allowing designers to present their own vocabularies and ways of working. Early cases of companies using a design thinking perspective (Rae 2008), and successes at the operational level (Labate 2011, Martin 2011) were accompanied by toolkits (e.g., Leidtka & Ogilvie 2011, 2012).

Like the discourse of designerly thinking, management-related design thinking has a number of different origins and expressions depending on the audience (Johansson et al 2011). These range from IDEO's use as shorthand for the competence offered by the design consultancy to company managers, to Martin's description as a creative managerial thinking process essential for organizational success and hence a necessary skill for business students (Dunne & Martin 2006, Martin 2009), to Bolland and Collopy's (2004) focus on metaphor and analogy as inspiration for management scholars. Along with others (e.g., Kimbell 2011, Rylander 2009), we are concerned about the lack of scholarly attention to the management-related design thinking discourse, and the

need to remedy this if design thinking is to develop its theoretical grounding and practical application.

ART AND ART-AND-MANAGEMENT

"Art is a human activity consisting in this, that one man consciously, by means of certain external signs, hands on to others feelings he has lived through, and that other people are infected by these feelings and also experience them." (Tolstoy's translated definition, Tolstoy et al 1932). Various forms of art, from visual arts and architecture to performing arts and literature, may be created for different purposes, ranging from communication, to an expression of the imagination, to entertainment and healing. Over the centuries western civilization has moved away from the meaning of the Latin word, *ars*, as a "skill or craft" towards the concept of fine art, where skill is used to express the artist's creativity, engage others' sensibilities, or draw the audience towards considering finer things, and now, in the 21st century, to an appreciation of the aesthetic experience (Dewey 1934) provided by all forms of art created by peoples from across the globe. Like design, art as produced by artists is a practiced discipline (McDonnell 2011), with clear research streams related to the various forms. Common to all artists, regardless of their specific technical expertise, is an *artistic process* as a series of problems and their controlled resolution using the *qualities* of their own means of expression (Ecker 1963).

Art-and-management, unlike design management, originated within academia, with theorizing related to organization theory. The early discourse was philosophically oriented, specifically relating to culture and the narrative turn, with a clear postmodern edge. The discourse developed along themes of recognizing emotions and senses as part of organizational life, with many theorists also being accomplished artists (e.g., Guillet de Monthoux 2004, Strati 1992, 1999, Hatch 1999, Hatch & Yanow 2008). Others made metaphorical connections to artistic practice (Vail 1989), and links with leadership (Steed 2005) and entrepreneurship (Daum 2005).

Within the art-and-management literature there are many suggestions and case examples of *arts-based learning in business* [*], when leadership or organizational development practitioners use artist's tools for individual or organizational learning, development or organizational change (Nissley 2010). Examples include the use of theatrical improvisation, music, storytelling, and drama, (e.g., Darsø 2004, *Journal of Business Strategy* 2010-31(4), 2005-26(5), Mirvis 2005). A subset of this stream includes descriptions of programs and curricula that use arts-based learning in management education (e.g., Nissley 2002). Quite separate are considerations of *arts in business*, as the exhibition or performance of artistic work in corporate or workplace settings for display or enlightenment, or the *business of art* as the funding, locating, and managing displays or performances of arts for pleasure, entertainment, or economic gain.

Artist in residence programs include a wide range of opportunities where artists and other creative people take time away from their usual environment for reflection, research, presentation or production, or interact with others, enabling cultural exchange and mutual growth. Such programs may take place within the community (e.g., www.villageofthearts.com), in schools (e.g., Bressler 2000) or in organizations (e.g., Harris 1999). Closely related are *artistic interventions*, defined by Berthoin-Antal (2009:4) as

> *a wide range of short- and long term forms of bringing people, processes, and products from the world of the arts into organizations. … to intervene means to come between, to involve someone or something in a situation so as to alter or hinder an action or development. Intermediary organizations, artists, and host organizations define the nature of the interaction, e.g., collaborative, provocative, entertaining, or playful.*

Accounts of artistic interventions include salespeople from the John Lewis department store (UK) working with a theatre group (Tweedy 2004), the comprehensive Catalyst program at Unilever

[*] The terms we define here are often used interchangeably by others. For an alternate framework of a sensemaking perspective on *workarts* see Barry & Meisiek 2010)

(UK) (Boyle & Ottensmeyer 2005), Learning Worlds artist-consultancy's work in US companies (Reaves & Green 2010), the NyX Innovation Alliances in Denmark, where 20 artists were paired with 20 companies for 20 days (Barry & Meisiek 2004) and the ARIS project in Sweden (Styhre & Eriksson 2008), forerunner of the project described here. The projects were diverse, involving artists from different areas in contact with different sized groups of employees, and had varying success. In many, outcomes cited were intangibles in the form of different ways of thinking and doing, with little business evidence of impacts. Following a review of the Scandinavian research protocols, Berthoin-Antal (2009) prepared guidelines for more rigorous evaluation. In addition, Gilmore & Warren (2007) question just "what" is being unleashed during artistic interventions.

THE RELATION BETWEEN DESIGN, ART, AND MANAGEMENT/INNOVATION

Design has an interesting relationship with both art and technology/production; if the relationship with art is removed, it is no longer design, only technology (Johansson & Svengren-Holm 2008). Design deals with aesthetic relations and the senses of human beings, which are at the core of art (Dewey 1934), yet there appears to be a rift between design and art in our culture (Coles 2005). This paper is a modest contribution towards righting this situation (see also Lindley 2012).

Although the academic discourses of design management and arts-in-management show little epistemological resemblance, there are many practical similarities. Both rely on a merger of knowledge from the faculties of art and of management. Art and design differ in the way that design is more purpose oriented and thereby could be seen more as applied art than as art in itself. Both art and design practice are taught in studios and where individual learning and emotional inclusion are recognized.

Innovation provides one connection between management and design, in particular through the use of design and design thinking. Around the millennium, strategic management approaches shifted from concentrating on the value chain to considering dynamic capabilities and, concurrently, approaches to innovation moved from strictly engineering discussions to ways of embracing the current complex reality. Design-driven innovation became fashionable through Kelley's descriptions of IDEO's practices (2001, 2005), Verganti's presentation of Italian designers (2006), and numerous examples in the business press (e.g., Adler 2006), with a parallel discussion in more scholarly texts (e.g., Dell'Era & Verganti 2009). There is also a scholarly discussion of "innovation" in the context of the arts, (e.g., Fitzgibbon 2001), but these concern new directions in the artistic product, not an artist's use of his or her competencies that is the focus of this paper.

In this paper we extend our understanding of "innovation" to encompass innovative organizational change and development initiatives. Organizational change has long been a theme of organizational theory (Pettigrew et al 2001), with organizational innovation consistently defined as the adoption of an idea or behavior that is new to the organization (Hage 1999). These frequently include changes in organizational culture, as the shared knowledge, values, meanings and the "unconscious mental models" of organizational members (Smircich 1983). Prior research in artistic interventions suggests that some artistic interventions produce lasting and possibly innovative cultural changes, in addition to changes with immediate economic impact (Darsø 2004, Reaves & Green 2010).

TOWARDS ARTS-RELATED "DESIGN" THINKING

Metaphorically, designers have one foot in artistic work and one foot in production or technical implementation; thus designers are artistic and more. Their artistic competence becomes clearer when considered in relation to artists working in similar processes. Confronting an initial indeterminate problem as "the blank canvas", sketching as visualization or prototyping, and reflection in action are aspects of the work of both artists and designers, and also the most basic elements of design thinking.

The above literature review suggests that the discourses of art and management and design management each deal with interventions from artists and/or designers and that these

interventions have implications that are interdiscursive in the sense that they affect organizations in ways that are far from restricted to traditional design or art perspectives. Both artists and designers can affect organizational culture and work processes, even if their work is not explicitly directed towards those areas: an artist works through emotions to create an experience, while a designer communicates that something exists for a purpose. Rather, the value of design and artistic interventions may be the side effects of the artistic work done.

METHODOLOGY

The empirical material comes from six Swedish projects (the KIA projects) that are part of a larger European study of artistic interventions in working life. Overall responsibility for the evaluation of the projects rests with Arhus University, Denmark, Dept of Communication, with a report published in the Scandinavian languages (Jensen et al 2012). Ulla Johansson, as founding director of Business & Design Lab at the University of Gothenburg, Sweden, evaluated the KIA projects using a combination of qualitative methods. These included informal conversations with company representatives at KIA conferences, and telephone interviews with the CEO, participants, and artists involved in each of the six projects. The interviews were recorded, transcribed and analyzed using an inductive and reflective method similar to grounded theory analysis (Glaser & Strauss 1967). All the work was conducted in Swedish, as is her formal report. Quotations in this and a conference paper in English (Johansson 2012) are the author's translations. We acknowledge that the evaluation protocol is subject to critique (see Berthoin-Antal 2009), but it was within the scope of the guidelines for the overall project evaluations

In addition to Johansson's material from her evaluation, this paper draws on the work of two other members of the Business & Design Lab. Doctoral student Marcus Jahnke made participant observations of meetings in the newspaper company, and presented his observations and reflections from a hermeneutic tradition (Jahnke 2012). One of the artists involved, Victoria Brattström, reflected on how she had used her special competencies as a director and actor when working with organizational development at the Skovde municipality and used a narrative style in the form of a film manuscript to record her intervention (Brattström 2012). All three researchers took a qualitative and interpretive approach (Alvesson & Sköldberg 2009), where pre-understanding from previous research and experience played an important role.

Here we revisit the empirical material for further analysis using our theoretical framework, and thereby come to new and different (but not contradictory) conclusions than in the earlier published material. Examples and quotations from the empirical material are used as illustrations for our arguments.

EMPIRICAL MATERIAL

TILLT AND ITS ROLE

The six KIA projects are part of a long-term endeavour to "bring culture to the workers" (Styhre & Eriksson 2008). KIA (*Kreativa Innovationer i Arbetslivet* or Creative Innovation in Working Life) is an interregional European project established in 2009 through cooperation between the Swedish organization, TILLT (www.TILLT.se/in-english/), and similar Norwegian and Danish organizations. TILLT manages collaborations between an artist (e.g., performance, visual, literary, musical or conceptual) and organization members to cross-fertilize the competencies of the two worlds, leading to both the artist and organization members rethinking what they do, why they do it, and how they work or operate, which is a key to development.

A member of TILLT, called a process leader, worked with organization leaders and their goals to develop a statement of need ("the challenge") then appointed an artist based on an assessment of fit between the maturity of the organization and artist. The artist used his or her competence to develop and manage the process in the organization, with the process leader providing support as

needed. Projects lasted between 7 and 18 months. The organization's CEO evaluated the results and outcomes.

OVERVIEW OF THE SIX PROJECTS

The six projects involved diverse organizations, a range of goals, and artists with different competencies.

Table 1. Overview of Projects: Organizations, Challenges, and Artists

Organization	**Organization's goal**	**Artist's challenge (Developed by TILLT & organization)**	**Artist selected by TILLT**
1. Pomona Balance Provides HRM services for business**es.**	To give employees more power and creativity.	(1) Develop materials that can be used to present and clarify Pomona's services for staff and external clients - film, print and / or experiences. (2) Start a process and make specific imprint / impression as a starting point to update and bring to Pomona's values in order to ultimately better able to market all of Pomona's activities and services.	Martin Bronze, magician and filmmaker.
2. Regional Newspaper	To reach new audiences.	(1) Reach new groups of readers (women and young people 20-40); (2) Develop sports and news pages; (3) Develop the newspaper's look and content.	Linn Greaker, artist and web designer.
3. Prison Probation Unit Oversees people who are convicted but sentenced to probation rather than jail.	To maintain its positive culture during a controversial move to the building that also housed the jail.	(1) Service development of staff for probation; (2) Preserve the good internal culture in the new premises and the new conditions; (3) Establish guidelines for treatment of clients by staff in connection with the move; (4) Raise awareness of our strategies, knowledge and values.	Peter Walselius, actor and coach.
4. Skövde Municipality Diversity Project	To improve diversity, both in local government and in the community.	(1) Strengthen and develop service managers in diversity efforts; (2) Increase knowledge about diversity issues.	Victoria Brattstrom, director, actress and teacher.
5. NK High-end retailer	Develop the sales staff.	(1) Develop salespeople's attitude towards customers; (2) Strengthen sellers in their professional role.	Victoria Alaric, dancer.
6. Almi Government institution promoting new business growth.	Rehabilitate an executive who was stressed to the point of burn-out.	Assist an executive with his personal goals	Mona Wallström, jewelry artist

The projects appear to have few similarities: the organizations are different in terms of ownership, size, and purpose (governmental organizations, local authority, big industrial organization, service organization/consultant, retail store) and their goals for the intervention projects differ, even though most deal with either communication or cultural development on a group level, with one at the individual level. But, as shown in the details below, the outcomes are much more alike.

EARLY INTERACTIONS BETWEEN THE ARTISTS AND ORGANIZATION MEMBERS

Organization members' (participants) first meetings with "their" artist were unlike ordinary business interactions, as described in their own words, with the exception of Almi where the researcher describes the process.

1. POMONA

> *The magician/filmmaker saw that we were using our heads so much. We think about processes and when we think we talk and talk - we think out loud all the time. So the artist thought we needed to work with the body, so that became the essence of the whole thing. He made some very simple exercises for us to use, 'to release and be free'. It was like kindergarten.*

2. NEWSPAPER

We met with the artist/web-designer each week. First it was about how to 'open the senses'. We had to do different things -- all kinds of things. We could choose images to show different characteristics, or we could paint or draw ourselves and describe things. We went out and about with cameras to use them for different tasks, and so on.

3. PRISON PROBATION UNIT

First we used metaphors to sensitize ourselves and express our identity. For example, the actor/coach asked, 'If you were to see your working group as animals or as a phenomenon, what would you see in front of you then?' And we talked about what each of us saw. Somehow this work with metaphors was a little bit of attack on our culture with different words and different conditions from what we usually do.

4. SKÖVDE MUNICIPALITY

In the start-up phase we got to know each other in meetings where our actress/director/educator led the discussion. I discovered we did not know each other particularly well. So we spent a lot of time in the beginning to get a little closer together, doing things together and build this relationship. We found out a lot about diversity: What do we each mean by that? What do we think it is? What does it stand for? And the concept became more and more complicated and less and less clear-cut the longer we thought about it.

5. NK

The first time we saw our dancer was in the front of our building. Music was playing and she was lying on the ground dressed all in white. She said nothing but assumed different poses. It was weird. Then the dancer demystified the situation. We sat in a circle and introduced ourselves and talked about quite superficial things. We said why we had chosen a particular piece of clothing we were wearing, and our relationship to it. That was the way we got to know each other.

6. ALMI.

The burnt-out executive visited the jewelry artist in her workshop where they talked about the process and conditions needed for making jewelry. The executive realized that the artist was a generally wise person and an organization outsider.

In each case the artist used his or her artistic methods to encourage participants to rethink their work practices, although details were quite different depending on the situation and the artist. Brattström (2012) calls this *exploring the given circumstances* as all the factors that affect the actor's performance on stage, both the set/setting and the actor's capacity to use his or her imagination, while Barry and Meisiek (2010) refer to it as *context shifting*, whereby artists use their media analogically.

FOCUSED INTERVENTIONS

After the initial activities, participants reported a shift in focus and the interventions became more clearly related to their challenge.

1. POMONA

Our artist was a magician and filmmaker and we said we wanted to make videos for our website about how our values show in our work. But after a few meetings we realized that it was not necessary to film, but we have been working as if we would film. We like

working with role-playing and building crowd scenes based on our values. So it's been very interesting to do.

One example was about 'meeting all where they are', meaning everyone should be seen as part of us, whether it is an electrician or a customer or an employee. And everyone should be treated the same way. We made scenes such as, 'how we meet an alcoholic, or a dark-skinned stranger, or a very wealthy person, or an impoverished person.' In the different scenes we are testing values of the companies against our own internal images, so we are able to deal with prejudices. We played some very exaggerated scenes. We had to feel what it is to be a low status person - what is low status for us? So, we had to visualize it, or try to show it to each other. We went around the room role-played if we felt depressed or if we had high status - how did we look then? Then we discussed it. How did it feel? There were plenty of these exercises.

2. NEWSPAPER

After a month we started to talk about what we could do with our product, to improve it. The only thing we'd already decided was that we should appeal more to a specific audience, women ages 20 to 40, because according to studies, women decide what newspaper should be read in the household – so it was a tactical decision. Many see us as a small local newspaper and we are sometimes a bit old-fashioned. We have a lot of older readers, and perhaps that reflects some of what is printed in the newspaper. So, that was what should be improved.

We talked a little about how we could do it, and our positioning to make a fresher newspaper. We did some survey research on the town, asking what people thought about the newspaper and so on. We discovered that most people liked the newspaper - but it scored high on giving an archaic impression. We continued with identity studies of the type: If you had to give the newspaper names and ages as a person - whose name and age would you give? And if the newspaper was food - then it was home cooking. What animal did the newspaper resemble - a Saint Bernard dog. So it became a bit silly.

But we came to some answers. Page two was incredibly dull and not read by many. Instead we decided to have some lighter material on that side, called 'the chronicles.' We hired some skillful young women writers to write about different themes: children, sex education, entertainment, and the environment- things we learned were important issues for women. We've added some lighter material, such as amusing events, photos from readers, surveys, and questionnaires. We linked it to our Facebook page where we write about things separately from the newspaper and where we get a lot of opinions.

3. PRISON PROBATION UNIT

We wanted to create an impression that would be permanent and remain in 'in our everyday lives.' With the help of our actor/coach this became a play that took an historical perspective on our business activities. At the premiere there were creative workshops to work with dreams and visions in different ways.

4. SKÖVDE MUNICIPALITY

In the next phase we each had a disposable camera and the task of documenting the diversity in our town. We developed the photos and made displays and looked at them, and talked about the types of diversity. One person concentrated on the diversity of

nature and biodiversity. We just said things like, 'That's a person who likes nature' – we didn't ask any hard questions about disabilities or immigration issues or anything like that. But then we understood that we did not know what diversity is and how we'll find it when we look back into the town of Skövde.

Then we worked in several different ways, but all in an attempt to relate to the situation in Skövde. We had workshops with exercises in reflection by design (photos, text, speech and physical form), and collected all documents regarding diversity in Skövde and discussed, What do they really say? What is diversity in Skövde? What have we found? Where does the municipality fit in these questions?

5. NK

The project continued along different lines. First, there was a workshop for the entire group. We called it the dance but that was not dance in the usual sense. We would each move within the group and be seeing other people without looking at them. It's hard to explain but you were to look into the distance, not at the other people close by, but we would take a short glance. We had that for moving about when we are at work and interact with our peers.

Afterwards we had a workshop on our strengths and weaknesses as a group and as individuals and we also talked about sharing information and communication in the group. Communication is difficult because we are a large group where everyone is not in the same location at the same time. How can we communicate so everyone will get the same information, and the right information? In meetings our dancer would call for 'the round', then everyone should be involved, it doesn't mean everyone should talk, which is very verbal, but all should be involved and think so you really get the word and remember it.

The dancer also made what we called a personal reconnaissance on each individual. She watched us on the sales floor and studied with the phenomena that are central to a dancer's skill, namely the patterns of movement and nonverbal communication. Afterwards she gave us personal feedback.

6. ALMI.

The executive continued visiting the jewelry workshop and learned about the concentration needed to make jewelry. She came to think of the artist as a therapist.

In this phase various groups were working more directly with the particular discipline or medium of their artist. At the same time they were coming closer to meeting the challenge for their organization. Participants told stories of the activities and their engagement in the process, rather than stating the challenge and explaining how they solved it.

COMPLETING THE INTERVENTION

1. POMONA

At the end we had a day where everyone tried the different exercises and a show with some magic. This created such a great memory. We laughed so much together, and perhaps the greatest benefit, we were clearly connected to each other even more. Now we have new energy, joy, and permission to be playful.

The role-playing scenes became so important that even though the project has ended, when are stuck in a situation and don't know how to solve it, we ask a colleague to join us in role-playing to find new solutions to the problem at hand.

It was messy at the beginning, but the work itself was fun, and now we have new tools. Our magician/filmaker was a truly remarkable person who understood our needs as individuals and had an understanding of the company's situation.

2. NEWSPAPER

We keep working to try to expand the news and introduce a new angle, what happened but add some additional items, and give the story more life by putting people in focus. We are trying to be a little more alert, become fresher. We have accomplished a strategic move. Overall, there has been an improvement, certainly a facelift.

Every morning we have a meeting and a longer meeting one day each week when we plan for the long run. It has helped create more order and be more proactive. This is perhaps not what you primarily expect from an artistic project - that it will create order and more anticipation. It is easier to be creative if you have a base to stand on, so you know what you have to fall back on.

Our CEO says there have been three major benefits. First is innovation: we've thought what it takes to be more attractive to younger readers. Then cohesion: our group's been strengthened in its way of working together thanks to this. And braver: we dare to try out more ideas now than before. Before we killed ideas when we sat and discussed. Now we often test and see. It may not work every time, but you've tried it. We're braver like that.

3. PRISON PROBATION UNIT

One obvious result is that people can now 'put words to' things that used to be cultural and taken-for-granted. Our culture has been made known, and therefore easier to protect.

We had a wonderful opportunity to work in a different way, with someone who has completely different skills. It was extremely positive. We laughed a lot. I don't know if you can call that a result. It may sound ridiculous, but it was actually very energizing. Maybe it's much better to say it that way - the whole experience was very energizing.

4. SKÖVDE MUNICIPALITY

We had photo workshop with another artist. We each had to choose a work of art at the art museum or art gallery or in art books that attracted us in any way, and she took pictures of them, and we described why it was we were attracted to the picture. This became our impression now that the project had ended.

The project changed us in our ability to discuss various issues, to analyze, and think about diversity. Our group of managers is closer and more honest in our discussion and engagement, things that we do not believe the other management teams have. Also, we've become more courageous, as individuals. And it has given the diversity concept a very broad perspective. But, unfortunately many managers preferred not to work with the diversity issue, so it's a relatively small group who benefitted.

We've had interventions before with knowledgeable consultants, and there we learned a lot about diversity, but I do not think we reached the same conclusions. Then we just had intellectual positions and didn't do anything with them. Now we have worked with diversity together and have conclusions that stem from within ourselves. Personally, I feel that I have a desire to use my creativity and dare to use my creativity in a better way.

5. HK

Our dancer was a little fly on the wall of our everyday lives at work and looked at how we interacted with customers, how we were moving and how we communicate with customers and each other when we have a customer. And then we received personal feedback and some practical tips on things you could think of changing or testing. She talked to me about how I move around on the floor and how I greet a customer. She asked, rather gently and pleasantly, 'What happens if you try to be a little more direct as well as, more and more sellin? ' When my old behavior returns I think about our dancer and remember what she said. That personal piece was very important. I do not know what she said to others, but I believe she caught the essence of things that you might do automatically and then suggest how you might think about doing something differently. Good clear, tangible things.

At the start we were all wondering, 'Are we supposed to become a dancer?' But during the workshops we realized there were similarities between the two jobs. Our roles are in the crowd/corps in a way, but not really. It's about the confidence that our dancer told us happens when they dance. We have to do a show here every day. At a dance performance you pay money and get something in return, so to speak. After the project we have a new awareness of our strengths and weaknesses. And we also have a new trust in each other – it's easier to open up to the group and talk about things we were not used to discussing. We have also improved communication - we dared to break the old patterns. Our dancer was just right for us.

6. ALMI

The executive learned how to reflect about the process while she made jewelry, and realized she could reflect in similar ways at the office. Afterwards she returned refreshed to her full-time position.

SUMMARY OF THE ARTISTIC INTERVENTIONS

At the beginning just about everyone involved asked, "What has working with an artist to do with our organization?" and early stages of the projects were almost always described as "messy". Some projects began with a meeting that provoked participants or discussed issues unusual for work. As time went by, working with the artist became more "natural", and almost all the projects ended in a company-wide event where participants demonstrated their learning and engaged other members of the organization in their new ways of working.

According to the respective project leaders, all six projects met their goals. Tangible results were achieved in most of the organizations, primarily in the repertoire of role-plays created at the HRM-services company, and the changing of the focus and design of the newspaper, but in many instances, results were described as "creating more energy and laughter", "access to our creativity", or "more courage and insight".

The process and changes were not of the type typically described in management and organization theory, but more in line with Strati's (1999) observation that organization theory has no smell, taste, sound or other sensual dimensions, while organizations in real life are full of them. The interventions, while clearly related to organizational development with the artist acting as

consultant, are more aptly described as artistic interventions. Many participants credited their artist with having particular skill in guiding the process.

Missing from the above descriptions of participants' experiences, are the parallel experiences of artists facilitating the interventions. Battström (2012) provides one account. Using the tools of her discipline, she writes a script that shows herself on the train returning from Skövde, thinking about that day's workshop. She struggles, reflecting on the actions and the emotions present then and now. Suddenly she grasps meaning, and immediately develops plans for the next step in the intervention. Through an abductive process, the solution emerges for the evolving situation at hand, played out against frames from the artist's own disciplinary experience.

ANALYSIS

The artistic interventions described above were not only about artistic actions, but also about something else. In this section we analyze the cases described above, using elements of our theoretical framework.

INNOVATIONS

Some of the projects, but not all, resulted in innovations in products, services or changed organizational processes. Two projects were innovations (Pomona Balance and the Regional Newspaper), one was possibly an innovation (Prison Probation Unit), one was probably not an innovation (Skövde) and two were clearly not innovations (NK and Almi). These results are summarized in Table 2.

Table 2. Change and Innovation in the Organizations

Organization	Type of change	Innovation	Type of innovation
1. Pomona Balance	Getting new energy through having fun Role-playing tools	Yes	Cultural innovation Working processes
2. Regional Newspaper	New pages with new content. New communication with readers through social media and new employees	Yes	Product innovation Customer communication (Marketing)
3. Prison Probation Unit	Better cultural awareness and new meeting culture	Maybe	Organizational culture
4. Skövde Municipality	New insights and approaches to diversity in the local authority management team	Probably not	Some organizational learning but not sufficiently widespread to be considered an innovation
5. NK retail store	Better awareness of their body language and better trust in the sales group.	No	Change was too small/localized to be labeled an organizational culture change
6. Almi	Better concentration for one of the managers.	No	[At individual level]

Results from artistic interventions are not "artistic" or directly related to the artist's field. However, in addition to changes in specific ways of working or communicating, participants come away with some more general creativity or ways of working with an open process orientation. From the organization's point of view, increased creativity and enthusiasm were as important as product or process changes. In her model of artful creation, Darsø (2004, p.150) considers such outcomes of artistic interventions as social innovations.

ARTISTIC PROCESS

Each artist used his or her process knowledge and artistic competence perspective at three levels. First, they used their technical competence, not directly, but for purposes of the intervention at hand, for example, at NK the dancer did not dance for or with participants but she used her knowledge of movement to analyze the salesperson's body language. At an underlying level, the artist used his or her abstracted competence to build trust, for example, confidence in others'

movements as in dancing, or the jewelry workshop to provide a safe place for the executive to reflect. At the most basic level, the artists used what we call an *open process orientation*, practiced by all artists, by relying on their emotion in the moment as the intervention developed to guide participants and the process.

TILLT maintains that the artist's specific discipline does not matter, more important are the individual's ability to work at the second and third levels that are generic to all artists. Similarly, designers have artistic roots, so an individual's ability to use his or her second and third levels of the artistic process may also be important during designer-led interventions when helping managers use design thinking to solve "wicked" organizational problems. For designers, however, when designing a specific artifact, design (thinking) tools and technical competence are most important.

DISCUSSION AND CONCLUSIONS

We have shown through our research that artistic interventions in organizations can be very similar to the interactions of designers when they bring "design thinking" into a company. We therefore propose that the discourse of artistic interventions and that of design thinking should be regarded as intellectual siblings. Engaging in this discussion can lead to theoretical awareness of similarities in the competences that designers and artists bring into the company, and ensures that the artistic component is always a part of designerly work.

We present comparisons between the characteristic of artistic interventions and design interactions in companies, including:

- Both introduce a more general creativity to individuals, thereby enhancing the creative culture of the organization.
- Both are process oriented, working with a combination of open and structured processes, and give organizations an experience of how to handle an open process, something that may be taken for granted in the artistic world but alien for many technicians and managers.
- Both introduce new activities (tools) and new ways of working/thinking/approaching problems by focusing more on opportunities than on analysis.
- Each artistic intervention had a number of levels. The workshops were somewhat related to the artist's specific skill, and about learning how to focus or how to find new approaches to problems or opportunities, or about organizational change as a form of innovation. Design thinking interactions include many of these aspects.
- An important part of a successful intervention is the selection of the designer or artist to lead the process. In this study, TILLT played a "matchmaking" role in clarifying the organization's challenge and selecting the artist. This process was quite different from the traditional way in which managers select designers directly from a design consultancy: the manager presents the problem to the designer and they establish the brief together. The "matchmaking" role may be essential when the artistic competence does not have a direct correlation with the problem or challenge of the client organization. Further research might determine the extent to which it also exists or would be beneficial for design-lead intervention.

We consider both artistic and design interventions as deliberate ways to make the company more creative by using the "tools" or competencies from these professions, although the tools are not as important as the results. In such situations we often speak of a designer bringing "design thinking" into a company. Thus "design thinking" could be understood in a similar way when an artist enters a company to facilitate an intervention.

We now ask, "Why is there no link between artists and designers in the context of design thinking?" The relation has seldom been discussed or mentioned: art and design belong to two different traditions, and art-and-management and design management even more so. Consequently, there has been little cross-disciplinary research. However, we believe that

examining design thinking opportunities as artistic interventions will strengthen our understanding of the process.

This paper makes both theoretical and practical contributions. We have indicated theoretical similarities between the discourses of design thinking and artistic interventions. These similarities are important, first, because it makes it easier to find specific characteristics common to both discourses, something that would benefit the management-related design thinking discourse with its weak theoretical anchoring. Second, explicitly acknowledging the artistic side of design within the design thinking discourse can give that discourse additional depth, and help prevent the design thinking discourse from being a superficial fad that dissolves into "nothing", as something in name only, used as a semantic marker for the work of designers in organizations. Practically, there are things to learn from the artistic interventions described in the paper. For example, the match-making role and process support provided by TILLT raises the question whether such support would also benefit designers who work within the design thinking discourse.

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Innovations in Design Management Education

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Zidulka, A. and Glovew, S. (2012). *Questioning the Accessibility of Design Thinking: How Can Individual Faculty Members Foster Creative Capacity in Business Students?*

QUESTIONING THE ACCESSIBILITY OF DESIGN THINKING: HOW CAN INDIVIDUAL FACULTY MEMBERS FOSTER CREATIVE CAPACITY IN BUSINESS STUDENTS?

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The teaching of design thinking seems to require a "design context," including a studio space and partnerships with a wide range of collaborators. For Business faculty whose classes are not situated within such a context, asking students to adopt design approaches may not be realistic, and Creative Problem Solving (CPS) may present a more accessible approach to fostering creative capacity. CPS offers the advantage of being similar to standard analytical approaches to problem solving, allowing business students to build on their existing strengths as analytical thinkers, while developing creative capacity in an incremental way. Moreover, as a generic model, CPS allows students to increase the level of creative risk, as they grow their skill and comfort level.

Keywords: Creative Problem Solving; Management Education; Learning Theory

This paper questions the accessibility of design thinking on two fronts. One, it questions whether design thinking's success as a pedagogical strategy hinges on it being embedded within a 'design context,' for example, within a studio environment where faculty and students from multiple disciplines are collaborating. If so, questions arise around what can be drawn from the design thinking movement by faculty whose institutions are not championing broader design thinking initiatives and who therefore cannot offer students an immersive design experience. Two, this paper questions whether the gap between business students' ingrained ways of approaching problems and those advanced by design thinking is simply too broad to bridge, if students are not working within the broader studio context.

This paper theorizes the authors' own experiences designing Leading Innovation, an MBA class for mid-career professionals, and their ultimate decision to use Creative Problem Solving (CPS), not design thinking, as the foundational model for the class. It describes the CPS model and delineates its advantages to faculty aiming to develop students' creative capacity within the context of a discrete class. These advantages include its ability to bridge between standard analytical and more creative approaches, thus allowing students to learn in a way that is consistent with best practices as defined by cognitive learning theories, as well as its generic nature: depending on their skill and comfort level, students can use CPS in what Elspeth McFadzean has termed either 'paradigm preserving' or 'paradigm breaking' ways (1998).

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THE CONTEXT: LEADING INNOVATION

Leading Innovation is a 3-credit online course at the end of an MBA program for working professionals. Students are an average age of 40, and most occupy mid-level management jobs. Leading Innovation is an elective, but students in this stream of the MBA have the choice of two out of only three electives. Therefore, in designing the course, the authors could not assume that students had a strong pre-existing interest in creative methods; course design had to accommodate the 'average' MBA student.

In establishing the goal of the course, the authors adopted Amabile's definition of innovation as 'the successful implementation of creative ideas within an organization'; this definition sees creativity, 'the production of novel and useful ideas in any domain,' as a necessary but insufficient condition for innovation (1995:1). The course aims to provide students tools in developing and operationalizing creative ideas within their professional contexts. They need not be the originators of these ideas. Rather, the authors would consider the course successful if students, as managers, gain from it increased capacity in, as the course title implies, leading others in developing and implementing creative ideas.

The 9-week course is divided into three units. In the first, students complete preparatory readings and participate in team building exercises. In Unit 2, students familiarize themselves with CPS through working as part of a student team through a 'live case,' a real-life challenge presented by an organizational leader. In Unit 3, students participate in a practicum experience, in which they lead a CPS session in a professional context. Students are responsible for arranging their own practicums, and as working managers, many do so within their own workplaces.

DESIGN THINKING AND THE CHALLENGE OF ACCESSIBILITY

It has been pointed out that design thinking, and more generally, creative thinking, cannot occur in a vacuum. Design thinking cannot be successfully executed if divorced from a design culture that fosters it (Ladner, 2010) nor can it be divorced from 'design doing.' As Sabine Junginger put it, learning design requires training not only the mind, but also the 'heart' and 'hand' (Junginger, 2007).

Writing broadly about creativity, Puccio, Murdock, and Mance put forward a systems model, which suggests that creative outcomes depend on the following factors: (1) people who possess the appropriate skills, knowledge, personalities, experience, and motivations; (2) engagement in an appropriate creative process; and (3) an environment that is conducive to creativity (2011:25-26). It follows that design thinking cannot be introduced into the business school simply as a process to be learned. Rather, the make-up of both the faculty team and the students, as well as the environment—the physical workplace and cultural norms—in which the education occurs must be considered.

Business schools that are pioneering the adoption of design thinking deserve credit for taking what appears to be a whole-systems approach, focusing on all three aspects of Puccio et al.'s model: people, process, and environment. From the people perspective, management design classes frequently push business students to work in multi-disciplinary teams with counterparts from other disciplines, as well as expose them to faculty from different disciplines. For example, the Stanford d.school is open to students of all disciplines: 'MBA students may find themselves sitting next to students in the design, medical, engineering, humanities and computer science fields. Courses are taught by an equally diverse assortment of faculty members, reflecting the collaborative philosophy of the program' (Sliberman, 2009:14). The inclusion of diverse faculty and students, in turn, promote a cultural shift. Writing of the Master in Business and Design at the University of Gothenburg, which brings together design and business students, Tullberg, Johansson, and Eklund observed that 'by joining and building a common practice and discourse, the students will develop mutual understanding and approach to each other's mind, rationality, and knowledge' (2008:9).

Moreover, while there are a handful of schools, such as Weatherhead and Sauder, that have integrated design thinking into the core curriculum, most design thinking courses currently being taught within the business-school context appear to be electives (Zidulka, Davenport, and Low, 2011), thus ensuring a self-selecting group of students, who presumably will be more motivated and perhaps more naturally inclined to engage in creative exploration. For example, in comparing MBA students who chose to take a creativity elective with the general population of MBA students, Kabanoff and Bottger found that those with certain personality factors, 'such as high preferences for achievement and dominance and low deference, are less likely than average to select the creativity course' (1991:241).

In terms of the physical environment, most schools currently teaching design thinking appear to be using specialized studio spaces. Some schools, for instance Darden, Rotman, Sauder and Stanford, have built custom studios, where students can work dynamically in small groups instead of sitting in a lecture space. Others, such as Tepper, Sawyer, INSEAD, and Haas, have gained access to a studio through partnering with engineering or design departments, which are either external or internal to their universities. The MBA in Design Strategy at the California College for the Arts provides students access to wood and metal shops, and model-making, welding, and rapid prototyping studios (featuring a 3D prototyping machine and laser cutters), as well as media studios for editing digital media, film, video, and sound. Finally, the Weatherhead design thinking focus is, in a sense, all about space as a critical part of design thinking. According to the school's website, the Frank Gehry-designed Peter B. Lewis Building 'redefines the way a business school should look, just as Weatherhead redefines the way management education should be taught.' Here and elsewhere, space is seen as integral to the process of teaching design thinking and indeed the argument would be that design thinking could not be fully realized in constrained traditional learning spaces (Bisoux, 2007; Boni, Weingart, and Evenson, 2009; Zidulka, et al., 2011).

In short, design thinking is fostered in circumstances that differ significantly from that of the average business classroom, with learning taking place both among different people and in a physically different space. Most design-thinking classes can be understood as contextualized within a broader organizational change project, which extends beyond the scope of a single class, and some of what is written on design thinking hints that its operationalization involves significant resource implications. For example, the Master of Business and Design at the University of Gothenbueg is housed within the School of Design and Crafts, due to the fact that the state provides more than twice as much funding per art student as per business student, suggesting that the design thinking curriculum may be more expensive than the regular business curriculum to implement (Tullberg et al., 2008). From a logistical perspective, the teaching of design thinking appears to require an extensive network of collaborators, including partner institutions, industry partners, and faculty collaborators from a variety of disciplines. While a single instructor or small group of instructors may possess some of these contacts—for example, it is not uncommon for individual faculty members to reach beyond the bounds of the institution and collaborate with industry partners on live projects—most are not ensconced within the seemingly vast web of connections that appear foundational to supporting the design thinking curriculum.

The degree of organizational change associated with the implementation of design thinking raises questions for faculty who lack the ability to provide studio-like environments for their students, but rather hope to foster creative potential in the context of a single class or through leveraging a more limited pool of connections. What is possible within this limited scope? Would teaching design thinking approaches have any meaning? Or, without the immersive design experience, would the gap between where students are and what design thinking asks of them simply be too great?

It should be noted that, while the environment and culture required to foster design thinking is undoubtedly important in any design context, it would seem particularly so when working with business students, whom research suggests might adopt creative methods less easily or intuitively

than others. For instance, using the Big Five framework of personality traits, which measures agreeableness, openness, conscientiousness, extraversion, agreeableness, and neuroticism, one of the largest studies to date on business-student personality type found that 347 business students scored significantly lower scores than 2,252 nonbusiness majors on ‘openness,’ the trait most associated with creativity (Lounsbury, Smith, Levy, Leong, and Gibson, 2009; Kaufman and Sternberg, 2010:121). Writing about instrumentalism, Pfeffer summarized multiple studies, concluding that, ‘business school students are the most instrumental in their orientation toward their education, viewing getting a degree in business mostly in terms of what it can do to enhance salary and job-finding prospects’ (2004:8).

This view was reinforced by Paivio, whose narrative study of business-school culture reinforced a general perception she had gleaned as a business student. Reflecting in her paper’s introductory remarks about her own experience, she wrote, ‘As business students we had adapted the prevailing expectation that we should develop strong commitment to instrumental rationality: the main question is how to achieve certain ends as effectively as possible’ (2008:60). Her later study of business-school culture revealed that, while great variety manifests among business students of different disciplines, a master narrative exists, in which, for the ‘ideal business student’:

> *The rationale of studying boils down to being able to exchange the master’s degree in the labor market for as good an occupation as possible…Correspondingly, slow progress, self-reflection, and waste of time on studying needles things without some guarantee of future job opportunities are seen as vicious and something that needs to be avoided.*
>
> *The master narrative emphasizes that the student also needs to acquire something from his or her investment. Besides the master’s certificate this means practical skills and tools. Theoretical thinking is useless and out of touch with real life. (2008:66)*

Moreover, two studies that explicitly compare design and business mentality show significant differences between those in the two fields. Eickmann, Kolb, and Kolb looking at learning styles found design students generally more ‘feeling oriented’ than business students who tended to be more ‘thinking oriented’ (2002). Using the Myers-Briggs Type Indicator (MBTI), Durling, Cross and Johnson compared the profiles of business managers with those of architects, fine artists, and design students and found that the architects and fine artists showed a preference for intuition, suggesting that they ‘use imagination...focus[ing] on ideas and associations, together with what might be,’ as opposed to business managers who preferred sensing, ‘addressing reality directly through the senses….focus[ing] on directly observable phenomena, on facts and practicality’ (1996:3).

Much research on personality types of business is debated within the field (see, for example, Pringle et al., 2010), and the above broad-stroke survey cannot be taken as a definitive last word on the traits of business or design students. That said, when understood in general terms, it is supported by anecdotal observations of faculty. For example, writing about experiences at Babson College, Pinard and Allio asserted, ‘Because MBA students tend to prefer linear thinking and concrete analytical approaches to problem solving, they are not likely on their own to engage in something as messy and unpredictable as the creative process.’ (2005:50). To anyone who has navigated both worlds, it seems self-evident that business students operate differently than design students: They value different things, think and learn in different ways, and exist within differing cultural contexts.

In designing Leading Innovation, the authors came to the conclusion that, given that we were operating within the context of a single class, design thinking was not the appropriate foundational model. For example, with our students’ instrumental orientation taken as a given, we were unsure of how design thinking approaches would work, considering the emphasis we knew would be

placed on grades. Moreover, we were also aware that our students, who work at mid-level managerial positions, while taking two classes (Leading Innovation and a second elective) and attending to domestic responsibilities, would likely be even more instrumentally oriented than their younger counterparts. We perceived the distance between who our students were and the business-school and professional cultures in which they operated as simply being too vast to bridge in a single class.

Instead of design thinking, we opted to frame the class using the Creative Problem Solving (CPS) model, which we judged would be more accessible to and appropriate for MBA students, enrolled in a single, discrete class. In the next section, we will theorize and expand on this conclusion by pointing to cognitive constructivist learning theory, which puts forward that people learn by making links between old and new knowledge and approaches. We will then describe the Creative Problem Solving (CPS) model and its advantages.

CREATIVE PROBLEM SOLVING AS AN ACCESSIBLE APPROACH

IMPORTANCE OF BUILDING ON PRIOR EXPERIENCE

It has been stressed in a variety of contexts that people learn by building on what they already know and that instructors can facilitate learning by explicitly building bridges between old and new knowledge. For example, cognitive constructivist theories of learning, rooted in the work of Piaget posit that students' existing schemata, defined as 'coherent knowledge structures that are stored in memory' (Cust, 1995:283) will determine how they perceive new knowledge. In linking such theory to professional education, Janelle Cust explained that schemata:

> *Arise from, and mentally represent, frequently experienced situations such as those pertaining to recognizing people, executing a tennis stroke, visiting the doctor, remembering the route to work, understanding the nature of a theory and reading a textbook. These contextually-based mental entities profoundly influence all aspects of earning including perception, comprehension, memory, reasoning, and problem solving….The absence of relevant prior knowledge impedes comprehension. (1995:283)*

According to Cust, the study of schemata leads to several teaching principles: 'The first imperative when teaching is to identify what students know about topics, concepts and issues as well as discovering how that knowledge is organised. Existing knowledge can then be built upon….Secondly, new knowledge must be linked to past ideas and experiences' (1995:284). Significantly, this approach to teaching presumes that learning happens in a cumulative and incremental way. According to Rogers and Horrocks, Piagetian theory implies that 'growth is linear, the development of the ability to cope with increasingly complex knowledge. Such views are not confined to the acquisition of knowledge or the development of new understandings; they apply to learning skills and attitudes as well' (2010:101). Schemata can apply to either declarative or procedural knowledge, and thus are relevant not only to what we know, but how we perform tasks such as solving problems.

The acknowledgement and linking of new and prior experience are particularly key when teaching adults, who enter into the learning situation with a rich storehouse of prior experience. In summarizing a 2008 volume of updates in adult learning research, Merriam wrote,

> *Connecting new learning with learners' previous experience is a longstanding strategy promoted by adult educators since Lindeman and Knowles. Recent research in several areas has confirmed the importance of processing new information or experience with prior experiences. Brain-based research has documented that 'when storing new sensory input, the brain "looks for" connections to earlier information'….These connections are our 'learnings'; with no meaningful links to prior experience little if anything is retained. (2008:97)*

Moreover, the importance of building on prior experience is further reinforced in the management literature on absorptive capacity, defined as an organization's ability to recognise, assimilate and commercialise new knowledge. In Cohen and Levinthal's seminal article on the topic, in which they argued that absorptive capacity hinges on the level of existing relevant knowledge and skills, they begin with an examination of the individual, positing that 'the prior possession of relevant knowledge and skill is what gives rise to creativity':

> *Two related ideas are implicit in the notion that the ability to assimilate information is a function of the richness of the pre-existing structure: learning is cumulative, and learning performance is greatest when the object of learning is related to what is already known. As a result, learning is more difficult in novel domains, and more generally, an individual's expertise—what he or she knows well—will change only incrementally. (1990:131)*

All of the above suggests that faculty who wish to promote creative thinking in business students—especially those who cannot accelerate the learning process through providing students with an intense immersive experience—may have more success in building incrementally on students' existing problem-solving expertise than they might in attempting to prematurely push students toward more foreign approaches to creative development. To promote lasting learning, faculty must meet students where they are at, allowing expertise to build gradually.

In the case of the authors' Leading Innovation course, we perceived Creative Problem Solving, described in the section below, as providing precisely the type of model that will allow this incremental growth to happen.

THE CREATIVE PROBLEM SOLVING PROCESS

Creative Problem Solving (CPS) is a structured process designed to guide the navigation and resolution of complex, open-ended problems. Originally conceived in the 1950s, it has evolved so that multiple versions currently exist, all which share an emphasis on separating and alternating between divergent thinking, which involves 'generating a diverse set of alternatives' and convergent thinking focuses on 'screening, selecting and evaluating alternatives' (Puccio, Firestien, Coyle & Masucci:20).The version discussed in this paper, which emerges from research at the Center for Studies in Creativity at Buffalo State College, frames CPS as a process comprised of four steps, as illustrated in Figure 1.

A key aspect to this model is the fact that each of the 6 sub-steps (Exploring the Vision, Formulating Challenges, Exploring Ideas, Formulating Solutions, Exploring Acceptance, and Formulating a Plan) listed in the figure, is itself, comprised of a divergent and convergent step. The problem solving process is thus broken down into repeated cycles of divergent and convergent thinking.

'Master Step,' Assessing the Situation, occurs throughout the process 	**Step**	**Sub-steps** **Note: Each sub-step contains a divergent and convergent step**	**Description**
	Clarification	Exploring the Vision	Establishing a goal or desired outcome
		Formulating Challenges	Identify obstacles that need to be addressed to achieve the outcome; focus on and frame the appropriate challenge
	Transformation	Exploring Ideas	Generate ideas and select preferred ones
		Formulating Solutions	Transform ideas into viable options, and decide between options
	Implementation	Exploring acceptance	Ensure the environment will support your thinking
		Formulating a plan	Create steps toward implementation

Figure 1 Steps in the CPS Process. Source: Adapted from Puccio, Murdock, and Mance (2011)

CPS is a flexible model. A given challenge often requires that only certain stages of the process be used, and part of the function of "Assessing the Situation," as the master step, is to determine which stages to focus on. Moreover, the model is generic and allows the possibility of any number of tools to be used in a given stage. For example, in deepening one's knowledge of the challenge in the "Assessing the Situation" stage, a participant could choose to use a tool like 5 Ws and an H--in which the CPS group responds to the questions who, what, when, where, why, and how, making sure to diverge through repeatedly asking, "why *else*" or "who *else*"—or one could use ethnographic research. One could also use both approaches—along with any number of other approaches for understanding the problem at both a cognitive and affective level.

Significantly, work emerging from the Center for Studies in Creativity has embedded this process in a broader ecosystem of associated thinking and affective skills. Puccio et al. have identified and explicitly defined specific cognitive and affective skills required for each stage of the CPS process. For example, in "Assessing the Situation," "diagnostic thinking" is required at the cognitive level, and "curiosity" at the affective level. For faculty, there are several advantages of these connections being made explicit: (1) faculty can better help students differentiate between each step of the process, (2) they enable instructors to provide concrete guidance at each stage, (3) they provide a cognitive and affective 'map' of how the creative process works, (4) they enable more explicit transfer of the model to other circumstances, (5) they enable the explicit link between a theoretical model and the practice of using the model, and (6) they make it easier to identify and use different tools that would be appropriate at each stage of the process (Puccio et al., 2005:59-60).

The CPS process has further been linked to a personality assessment, the Foursight Indicator, which enables practitioners to link their preferences, as problem solvers, to corresponding stages of the CPS process.

APPROPRIATENESS OF CPS TO THE MBA CONTEXT

There are several reasons that, in designing Leading Innovation, the authors perceived CPS as an effective approach for MBA students, most related to the fact that the CPS approach can be understood as building on standard analytical approaches to problem solving, in which MBA students are practiced and comfortable, while at the same time differing enough from these approaches to encourage growth in creative capacity. Specific reasons are delineated below.

- *CPS allows business students to develop creative capacity through building on their strengths, as analytical thinkers.* In cycling repeatedly between divergent and convergent thinking—and, indeed, by prescribing analytically focused convergent thinking 6 separate times in the course of a problem-solving cycle—CPS explicitly recognizes and leverages MBA students' well-developed left-brained abilities. MBA students thus enter into the creative process from a starting point of competence.

  Moreover, at the affective level, the pattern of returning repeatedly to convergent thinking contributes to the foundational feelings of comfort and safety that enable creative risk. Students who typically are not comfortable with the mess and ambiguity of delving into the creative process seem to enter into it more willingly, because they know that convergence will follow.
- *CPS is similar to problem-solving models students are familiar with, differing predominantly in emphasis, not underlying structure.* Several authors have mapped CPS onto standard problem-solving approaches, remarking on their similarities. For example, in writing of her use of CPS to foster creative approaches to Marketing case analysis, faculty member Cynthia Newman linked the steps of CPS onto the standard stages of case analysis and explained that 'this correspondence provided the instructor with confidence that an integration of CPS into the course could be accomplished in a seamless manner' (2004:28). Similarly, Hughes has mapped the stages of CPS onto those of 'a typical business decision process,' remarking that 'Political, governmental, educational, health care, or any other organization can match the CPS steps to its decision process…Using the present process will speed the acceptance of creativity' (2003:9).

  In short, CPS allows students to build a bridge between approaches they've already used extensively in their MBA and their professional lives and more creative methods.
- *CPS seems to hold equal appeal to students who do and do not self-identify as being creative.* In teaching Leading Innovation, the authors found that students who consider themselves creative report that they appreciate the way the CPS provides a structured approach to engage others in the creative process. What's been particularly surprising, however, has been the degree to which CPS seems to have provided to students who self-assess as non-creative a gateway to taking a leadership role in the creative process. Here, it is important to differentiate between *being* creative and *leading* a creative process—or, as the authors' course title implies, leading innovation. In several instances 'non-creatives' seemed particularly successful at leading a creativity session in their workplace, as part of their practicum, seemingly because they were good at anticipating and countering where they might encounter resistance from participants.
- *CPS provides faculty with a comprehensive framework to present creative capacity in terms of well-defined skills, mindsets, and attitudes to be developed—as opposed to as an identity to be embraced.* The textbook used in Leading Innovation, *Creative Leadership: Skills that Drive Change,* provides detailed descriptions of the cognitive and affective skills associated with each stage of the CPS process. This means that students can not only familiarize

themselves with the steps of the CPS process but also access information about thinking and attitudinal skills to develop in order to succeed in it. In the words of Puccio et al.,:

> *The framework of the CPS process is useful in helping people organize and articulate their thinking skills and problem solving at the same time. In this sense, the CPS process is like a macro thinking process that can contain and use a variety of processes, skills or tools. From this perspective, discrete and definable thinking skills can be sufficiently isolated within the framework of the CPS model to provide additional rubrics for people to identify and choose kinds of thinking that will help them operate effectively.* (2005:61)

Moreover, the link to the Foursight Indicator facilitates teamwork, since it allows students to launch into the CPS team process, having used their Foursight self-assessments to strategize around (Puccio, et al., 2011).

In all, CPS goes beyond simply providing a process, and offers students with an entire system for understanding and entering into creative problem solving.

- *Extensive research into CPS's theoretical foundations and effectiveness in the professional context make it a credible model to introduce to MBA students.* The effectiveness of CPS has been extensively researched in the organizational context, lending it credibility with MBA students (see, for example, Puccio et al., 2006). The CPS-oriented textbook *Creative Leadership: Skills that Drive Change* is an invaluable resource in providing both the theoretical grounding that is appropriate to a Masters-level class and the on-the-ground practical tools needed to execute a CPS session.

CPS AS A GENERIC MODEL

Until this point, this paper has focused on the advantage of CPS lying in its proximity to business students' existing paradigms. It should be stressed, however, that as a generic and flexible framework, CPS can be used in more creatively risky and less incremental ways, as students develop capacity. Here, it is helpful to refer to McFadzean's mapping of creativity tools on a continuum, with those that are low-risk, being 'paradigm preserving' and those that are higher risk being 'paradigm breaking.' Paradigm preserving approaches encourage but do not require participants to make creative leaps. An example would be brainstorming, which allows participants to choose how much risk they wish to take. An example of a paradigm breaking approach might be visioning exercises, which require that participants move outside the realm of the analytic (Mcfadzean, 1998).

In stressing the relationship between CPS and standard analytical approaches, this paper has positioned the process as paradigm-preserving. It's important to note, however, that those who are comfortable working within the creative realm can delve more deeply into the divergent stages of CPS and use it in a paradigm-breaking way. For example, less analytically focused design thinking approaches are compatible with CPS. As mentioned above, ethnographic research can be the method used during the stage "Assessing the Situation." Similarly, prototyping can be a tool of the "Transformation" stage. In other words, CPS allows students to gradually grow their skills by establishing how much to push the limits of their comfort zones at any given time.

In instructing Leading Innovation, the authors have explicitly taken advantage of the generic nature of the model, allowing students to ascertain for themselves the degree of creative risk they wish to experiment with. In the first unit of the course, in which students prepare to work in teams to address a live challenge using CPS, they complete an exercise in which they set 'process experiments': Teams are encouraged to stretch themselves to adopt practices that differ from their default ways of approaching problems. Each team commits to 3-5 experiments, which represent

creative ways of working together. For example, teams might commit to doing an emotional check-in twice a week, to using visuals, or to doing a role play as a way of delving into the challenge with which they will be presented. In the past, some teams have chosen to adopt fairly safe, paradigm-preserving experiments, while others have adopted ones that are risky and paradigm-breaking.

It is, of course, always exciting for us, as instructors, when teams commit to paradigm-breaking experiments, but we believe in the importance of allowing students to decide for themselves the degree of risk they wish to take. CPS allows for this personal decision making, as it is able to accommodate students who are comfortable at different points along the paradigm-preserving and paradigm-breaking continuum.

CONCLUSIONS AND QUESTIONS

A question remaining around CPS, as an approach, is whether it goes far enough. On one hand, it can be argued that it does: To learn effectively, people must be met where they are at. In the case of business students, this means that faculty must accept, and indeed appreciate, their strong analytical skills and build on them. Business students need to approach creativity, as business students. (Indeed, the authors suspect that much of the current pedagogies surrounding creativity education in the business context, whether they are rooted in CPS or design thinking or other approaches, are prototypes rather than end-points, which in the course of the next decade will help lead us to an approach to innovation that is native to business, as opposed to imported from another culture.) If students wish to—or their context calls them to—move to more intuitive and creative places, CPS can serve as a stepping stone, allowing them to develop the skills they will need. Finally, CPS offers the further advantage of being directly transferable into the workplace. In completing their practicum activities, Leading Innovation students are able to immediately apply their model in their professional context.

That said, given the scope of the problems faced, within society and within organisations, it is possible that this incremental approach is out of step with what is needed, and that we should be looking immediately to radically different ways of thinking and problem solving. Given the rate and necessity of change, it is possible that our students simply will not have the luxury of climbing a slow learning curve, as they develop creative capacity. The authors hope that, within the Leading Innovation course, students who feel this is the case will take advantage of the opportunity the generic model presents to bring in more right-brained, intuitive approaches, which they are pointed to and given the option of employing throughout the course. For example, there are many design thinking-related readings, both on the required and the optional reading lists.

In conclusion, it should be noted that, when the authors began designing the class, we believed that design thinking was an approach to aspire to: it was the approach we would have wanted to adopt, if we had the resources. We no longer see things in this way. Rather, we perceive CPS as providing an appropriate approach for working professionals, one which they can use immediately to effect positive change within the diverse cultures of the organisations in which they are embedded. We hope that, design-thinking educators will find this paper's introduction to CPS to be useful, as a model that is compatible with design-thinking approaches.

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NEW ORGANISTIONAL LEADERSHIP CAPABILITIES: TRANSITIONAL ENGINEER THE NEW DESIGNER?

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Traditionally, design has been centred within the manufacturing and production areas of companies and or as a styling afterthought. Increasingly, design is viewed as a vital and important strategic business resource (Dell'Era, Marchesi & Verganti, 2010) and consequently companies worldwide look to design to help them innovate, differentiate and compete in the global marketplace. The role of the professional designer is evolving to a point where they are needed to work beyond being a specialist in the manufacturing and aesthetics of an artefact (Wrigley & Bucolo, 2011). This paper challenges the values held by academics and industry regarding the traditional role of designers in business. It investigates the emerging transitional engineering framework and puts forward a proposal for the next generation designer in the future era of design. Questions surrounding how designers will develop these new skills and how the Authors' new framework of design led innovation can contribute to the future of design will be presented. This research is needed to better equip future designers to have a more central role in business.

Keywords: Design Integration, Design Facilitation.

INTRODUCTION

Design is a vital and important strategic business resource that contributes to innovation (Dell'Era, Marchesi & Verganti, 2010), resulting in many companies worldwide look to design to help them innovate, differentiate and compete in the global marketplace. They do this by seeking design benefits such as increased quality of goods and services, improved production flexibility and reduced material costs (Cox, 2005).

The value of design is evident through a different way of thinking, doing, and tackling problems from outside the box. In practice, design is seen as the key to greater productivity and results in higher-value products and services, better processes, more effective marketing, simpler structures or better use of people's skills. Design is more than a niche market luxury. It is the most persuasive priority for solving problems, ensuring long-term business sustainability and gaining competitive advantages.

Understanding the historical development of the design profession is important for the context of this paper. For example, William Morris in his time would consider a designer an artist (Gorman, 2003), someone who is experienced in their craft through materials and handmade techniques. However over time, advancements in technology have enabled mass-production and engendered designers as specialists in manufacturing, ergonomics and aesthetics. Designers were then often used as a late stage add-on to make products or ideas attractive to customers. In the

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present day however, it takes more than new technology for a design to be truly innovative. Designers are now being brought into the front end of the design process, at the stage where they can create products and services to successfully meet the customer's wants and desires (Brown, 2009).

To successfully profit from innovation, firms need to excel in technology development and product innovation but also in business modelling and business model innovation (Teece, 2010). Chesbrough (2010) argues that a mediocre technology pursued with a great business model may be more valuable than a great technology exploited via a mediocre business model (Chesbrough, 2010). Designers, therefore, need to learn how to transition between designing products and designing business models in order to engage in the new frontier of design.

THE MISSING LINK IN DESIGN AND BUSINESS

Martin (2007) asks why design and business can't be friends? He states that the reliability drive of business versus the validity focus of design creates tension. The conflict between reliability and validity plays out in the relationship between the two. Martin (2009) also suggests the way to get along is to: appreciate the legitimate differences, empathise, seek to communicate on each other's terms, use tools both sides are familiar with and change comfort zones. Moore (1999) builds upon this by addressing the diffusion of innovations and argues there is a chasm between the early adopters of the product (the technology enthusiasts and visionaries) and the early majority (the pragmatists). Moore (1999) explains that visionaries and pragmatists have very different expectations, and he attempts to explore those differences and suggest techniques to successfully cross the *"chasm",* including choosing a target market, understanding the whole product concept, positioning the product, building a marketing strategy and choosing the most appropriate distribution channel and pricing. The future of design lies in the coupling of project and business levels in a holistic approach to all products, services and above all experiences. This correlates with broader research trends that indicate design is moving away from a product centric approach and towards a method centred on business model innovation.

DESIGNING BUSINESS MODELS

In existing literature, the *'business model'* concept has been defined and referred to in many ways; as a statement, a description, a representation, an architecture, a conceptual tool or model, a structural template, or a method (Amit, Zott, & Massa, 2010). Thus, there is no consistent definition of what a business model is. However, literature describes key components of a business model as highlighting the notion of value (value stream, value proposition), monetary and financial aspects, and aspects related to a firm's exchange relationships (e.g. delivery channels) and competencies and activities (Chesbrough, 2006; Teece, 2010; Margretta 2002; Zott & Amit, 2010). Therefore it can be agreed that the notion of value is central to any business model (Teece, 2010).

Nowadays, the term *'business model'* is ubiquitous and almost central to today's management practices (Margretta, 2002; Johnson, Christensen & Kagermann, 2008). Although business models have always existed, the conceptual business model has been of increasing interest to practitioners and academics alike since the mid 1990's. All businesses either explicitly or implicitly employ a particular business model that describes the value creation, delivery, and capture mechanisms (Teece, 2010). Osterwalder and Pigneur (2010) provide an illustration that effectively summarises this theory and they refer to it as the business model canvas (Figure 1).

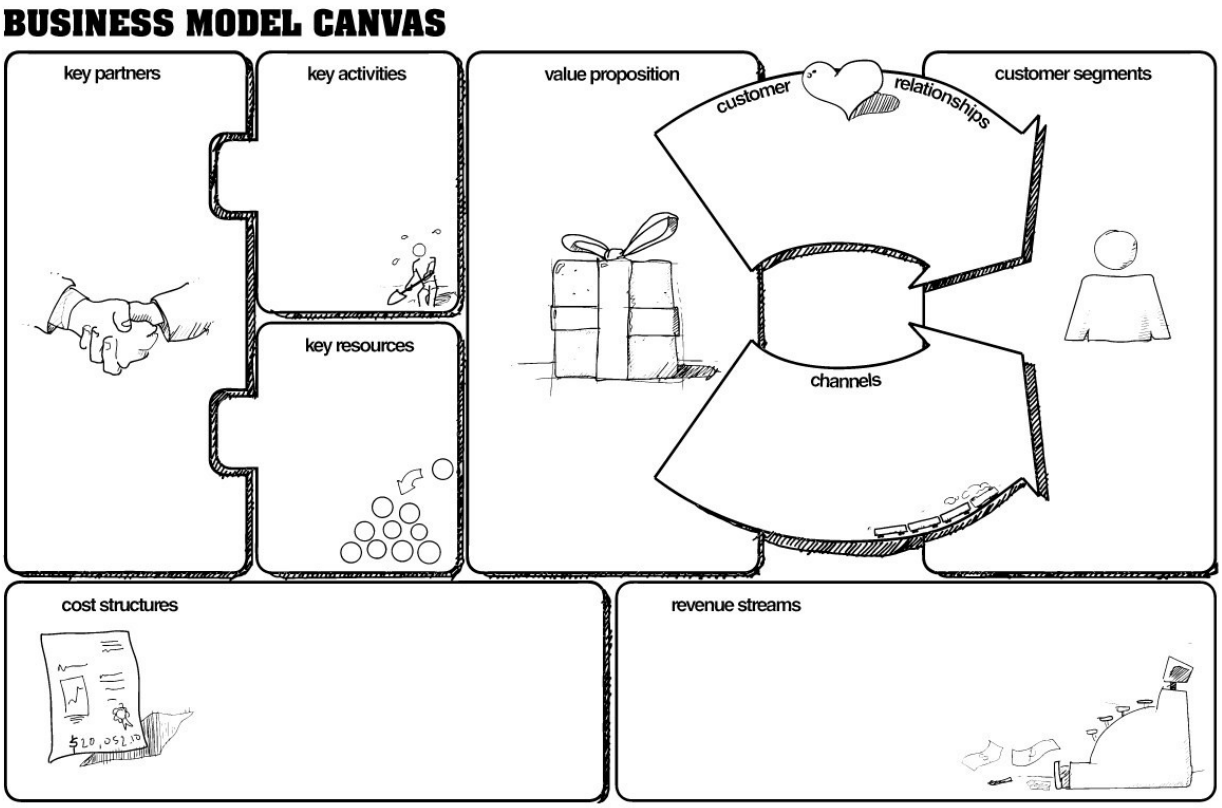

Figure 1 – Business Model Canvas (Osterwalder & Pigneur, 2010)

In order to create novel business models, design prototyping is imperative. When prototyping, the focus is on the iterative learning and exploration of new business model options, rather than testing pre-defined hypotheses. Design and design led innovation may significantly enhance a firm's capability in exploring and prototyping innovative business model options without restricting the firm to a set of pre-defined alternative solutions. Design enables business model innovation to make new discoveries by constructing alternative futures. Further, business prototypes and artefacts in different forms and levels of abstraction may enable business model "designers" to toggle back and forth between the real and abstract world and explore radically new business model options.

New designs have to fit into the competencies of a company; they must fit the launch schedule, marketing brief, manufacturing bill and funding model. Any new design that does not take each of these factors into account faces many barriers to market. Norman (2010) claims that the innovators job is not over until all of these barriers have been taken into account so that the entire system will work smoothly. He states that "innovation is a systems issue; it is not about product or process, but the entire system" (Norman, 2010:40). Innovation is a very complex topic, thoroughly discussed in academia, which is not something most designers in practice follow, highlighting the research-practice gap espoused by Norman (2010), further detailed in this paper.

The business model constitutes multiple value creation processes, which is partly branding, service model, funding, distribution and activities. Norman (2004) states that emotion is fundamental to all human behaviour and urges that it be infused into every aspect of the design process, but what about infusing it in every aspect of the business model? How can design and emotion be transformed into a business capability, not just a product capability?

DESIGNING PRODUCTS TO DESIGNING BUSINESS MODELS

In order to make the shift from designing products to designing business models many barriers must first be overcome. Among these barriers are language, facilitation, and designing both sides of the business model. The project level and business level are two very different things that require very different skill sets. Yet the real opportunity for innovation is to design them together, for the simple reason that if you just employ design at the one level (the project level) a product will emerge disjointed from the rest of the business opportunity, holding no central value proposition.

In order to do so designers must first learn the language of business, they must also be familiar with all nine blocks of the business model canvas and the impact it can have on the overall design approach. They must have the ability to design around the organisational capabilities and barriers and to address the language impediment that designers encounter when conversing with businesses and their needs. The visual language of design can assist in this communication as well as the delivery of tangible outcomes and additionally be used as a tool to facilitate a conversation between the two parties. In business model literature, there are a variety of tools and frameworks used to describe and develop new business models (Zott & Amit, 2010); some of them do so successfully by creating visual representations infusing both the project and business levels of the organisation (Chesbrough, 2010; Osterwalder & Pigneur, 2010).

It is clear, that a new role is required in order to address both sides of the business model in conglomerate and that the primary function of this role is facilitation. This ‘facilitator’ needs to speak both languages along with the ability to unpack design expression whilst simultaneously working within the constraints of a business model. Designers are skilled at making various forms of prototypes and artefacts in both the real and the abstract world. Throughout the process of design, various tools help to create *‘tangible’* representations of *observations, frameworks, imperatives (or ideas)* and *the final solution.* Design led innovation may significantly enhance existing tools used to create such representations of business models making the intangible tangible and helping to move back and forth between the abstract and real world.

To explore *‘novel’* business models, firms need to first challenge their existing beliefs and assumptions; thus, prototyping is essential. As discussed above, design-led *‘prototyping’* refers to unlocking a mindset, representing many future possibilities not just those a company plans to implement. It allows for more than one concept to be held abstractly at once, while bringing pieces down into the concrete as they are needed, this becomes more of a learning and exploration process that companies embark on. To explore the ‘unknown’ firms should not restrict themselves to a set of pre-defined alternative solutions. Design led innovation may facilitate the exploration of new business model options by moving far away from the concrete and real world (Figure 2) and prototype business model options in the abstract world first. A ‘deep dive’ into the abstract world to explore unknown alternative solutions is essential in the early stages of the prototyping process and design led innovation may facilitate this significantly. However, at some stage designers have to move back into the real world and engage in what the Authors’ call *‘experimentation’* and testing of predefined solutions.

To conceive and design novel business model value propositions, firms are required to envisage future options of value creation and capture. However, in novel and meaningful business model innovations value is not created internally by one single person, department, or even company. It is created within the ecosystem of different stakeholders (Adner, 2006). Especially in service industries value is co-created by a large number of stakeholders collaborating in a service system while developing tangible and intangible assets and resources to the value creation process. Furthermore, the ‘meaning’ of business models is not delivered it is ‘co-created’. Thus, designing novel business model propositions implies designing future ‘co-creation’ opportunities. Such opportunities may require interactions with various stakeholders – including customers and complementary partners. Design led innovation as a participatory and iterative process may facilitate this progression by proposing future value propositions to various stakeholders,

communicating value through the co-creation processes and also prototyping in a collaborative manner and therefore mitigating risk for the company.

From a 'technology' and 'functional' world-view, problem solving moves from technological functions and solutions directly to observations. However, we propose that design led innovation will help to reframe the problems and propose business model *'propositions'* that *'mean'* value for the customer. Design led innovation may facilitate constant back and forth movement between the abstract and real world, across all dimensions of business models such as markets, pricing, delivery channels, resources, business relationships and so on. Design led innovation may start from the comprehension of subtle and unspoken dynamics in socio-cultural models and may result in proposing radically new meanings for how firms create and capture values (Verganti, 2010). Further, it may help to challenge the existing and dominant business models in industry by linking new technologies to new *'meanings'* with customers and partners. Thus, design led innovation may enable new entrants in mature markets to *'disrupt'* not just from a technology point of view but also from a business model standpoint.

THE DESIGN LED INNOVATION FRAMEWORK

In order to overcome the barriers in moving from a product to business model design approach, the design led innovation framework has been developed. The Authors' argue that the design led innovation framework is an effective model to facilitate business model innovation.

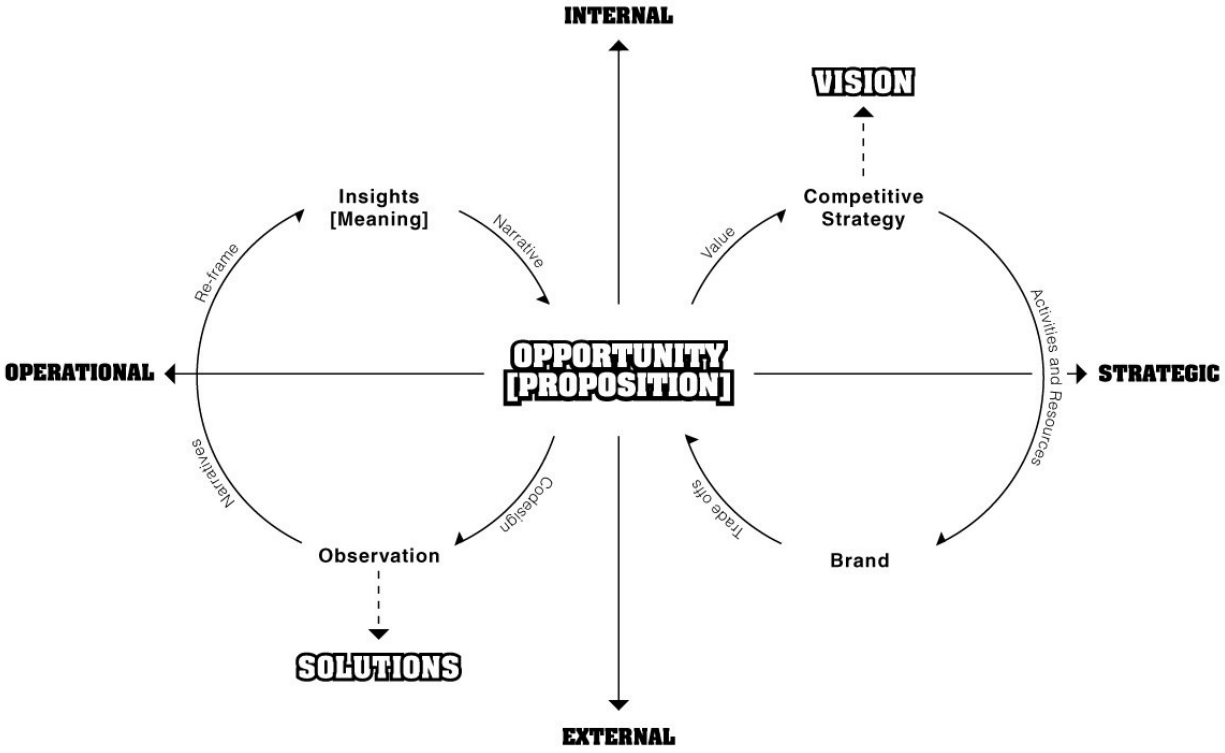

Figure 2 – The Design Led Framework (Bucolo & Matthews, 2011)

The proposed design led conceptual framework has been previously published by Bucolo and Matthews (2011) and was designed to assist companies who have the desire to grow through embedding the strategic value of design within their businesses (Figure 2). The framework illustrates that within any business a varying scale exists between operation and strategic activities. Activities that have an internal and external focus. Different departments within an organisation are assigned with these different activities and have specific targets, dependant on their functional role

within the organisation. The model uses the term *'opportunity'* or *'proposition'* as the central goal, which unites all aspects of the business together. As the design concept matures, all aspects of the business are informed or have the ability to inform the opportunity, creating change and growth.

From the above design led innovation framework it has been identified that there is an emergent role in the translation from the abstract to the concrete as well as the project to the business level. But who should facilitate this role? In order to investigate this new role the Authors' looked to Norman's (2010) work on *'transitional engineering'*.

TRANSITIONAL ENGINEER

Norman (2010) proposes a grey area in-between research and practice; he refers to this as *'transitional engineering'*. This is a third discipline inserted in the middle to translate between the abstractions of research and the realities of practice. Described as *'transitional developers'* they act as translators, converting research into the language of business while also translating business into research. Bridging the gap from practice to research and research to practice. It has also been presented by Norman (2010) that the design research-practice gap can be overcome by better trained researchers, improved integration of design teams, and sharper attention to the needs of the product faction. This gap is vast and in order to bridge it, new knowledge, new skills and even a new type of practitioner, coined the *'Transitional Engineer'* is required.

Based on the theory provided by Norman (2010) the Authors' suggest similarities between the research-practice gap and the design-business gap. It is proposed that both could be overcome by using an intermediary translation team. This team would translate the knowledge into practical realisations that the team (business) can then develop and deploy. However, a limitation of Norman's (2010) research is that it is currently only a proposition, it is still unknown who will take on this new role or how they will do it?

Norman (2010) argues that once a product or service design direction has been established then human centred design (HDC) research can be employed with customers to enhance and improve it, not before hand. HCD designers get brought into a project too early in most cases as they understand the value proposition but at a project level only. The problem is complex and HCD does not factor in many business level variables needed. So who takes ownership of managing this holistic process? Designers need a different mindset at the start of a project than they have at the present time. They require different knowledge, processes and tools to crossover from the project level into the business level.

Building upon the framework established by Bucolo and Matthews (2011) the role of the Transitional Engineer is proposed through the Transitional Engineering Framework (Figure 3). As illustrated in figure 3, the two levels (project and business) are illustrated, representing the research and practice areas (Norman, 2010) as well as the design and business areas (Martin, 2009). This means moving an idea from the researcher (bottom left hand corner) through the research project (top left hand corner) to the user (bottom right hand corner) then through to strategy (top right hand corner) and that is difficult. It is this constant loop of conceptualisation back and forth between the parameters that creates real value for each stakeholder involved.

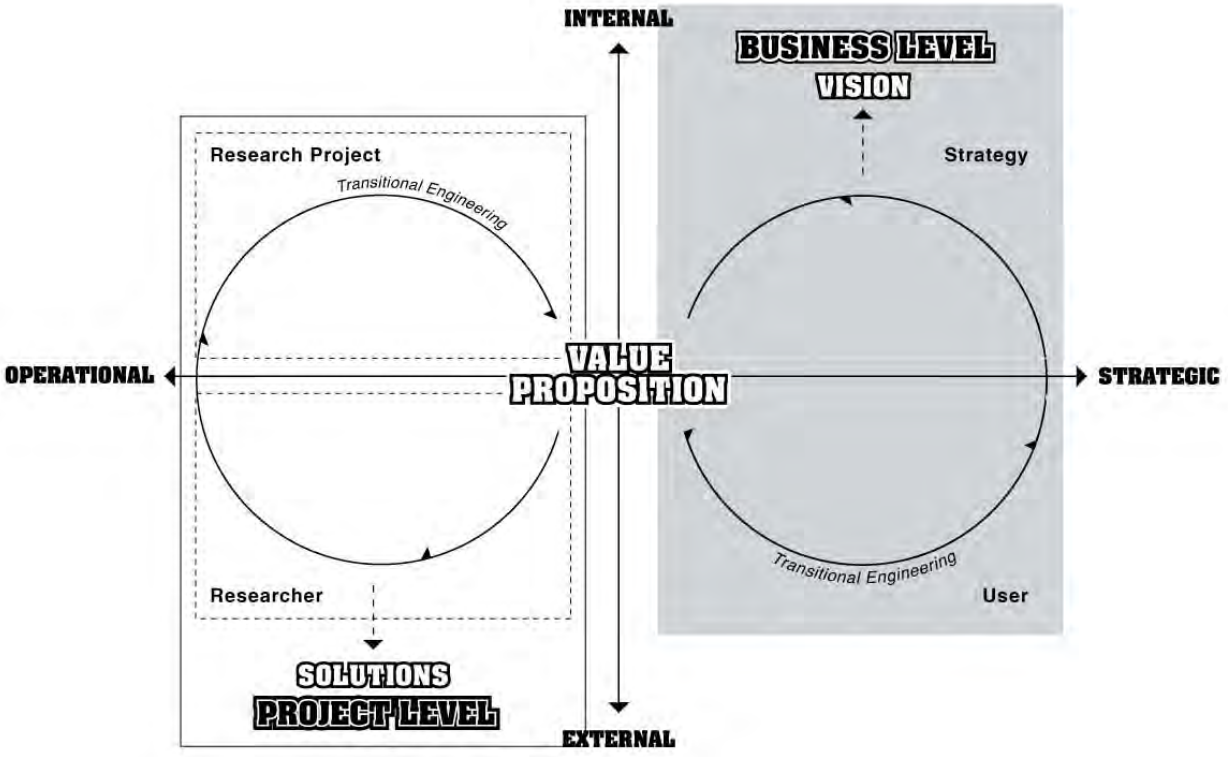

Figure 3 – Transitional Engineer Framework

Through exploring this framework in various settings, initial observations have revealed that ownership of the *"proposition"* is often unclear within an organization, and generally it requires a new role and responsibility. The term *design leader* or *design champion* is sometimes used to describe this responsibility, but the Authors' believe that it is more than just a leadership role that requires design capability, because *design leader* implies primarily an advocacy role. In addition to advocacy, the role also requires a deep understanding of operational requirements, business needs, and strategy and therefore requires something more like a *design interpreter*—someone who can influence and synthesize opportunities across the organization. Norman's (2010) notion of *"transitional engineering"*—a third discipline inserted in the middle of business and design to translate between the abstractions of research and the realities of practice—may provide a solution. Described as *transitional developers,* these people act as translators, converting research from the design field into the language of business while also translating business into design problems for designers to then address. This paper builds upon these insights and highlights the need for new organizational capability when adopting the design led innovation framework.

RESEARCH APPROACH

The motivation for this research originated from the Authors' experiences as design practitioners and educators who have, over recent years seen a significant transformation in the role of design in business. Key to this approach was the development of a framework to better understand the value of design in business, previously reported in Bucolo and Matthews (2011). The new role that designers must undertake and foster has been identified and it is proposed that this new role will be key in enabling the model to be adopted by business. This framework has been developed through a business and design lens. To do this, the Authorss have explored this approach by working with students and businesses using Schön's (1983) reflection in action research model. As per Schön's 'Action Paradigm' (1983) the observations presented in this paper were captured by the Authors' while simultaneously practicing and immersing in data over a period of time. This

involved engaging with companies across many sectors and sizes to assist them in becoming design-led, through the delivery of long-term design intervention approaches. Companies ranged in size from multinationals to SMEs and start-up enterprises. The outcome of this process was a revealing of new understandings of authentic business transformations and the role designers play within this process.

NEW ORGANISATIONAL LEADERSHIP CAPABILITIES

Norman (2010) started this conversation by asking who manages these new tasks of the transitional engineer? In relation to the design led innovation framework similar concerns are evident. Bridging the gap from product to business model design proposed by the Authors holds similar challenges. Based on Normans approach a third discipline needs to be added in-between the two disciplines of business and design. A role that facilitates and leverages the skills and capabilities of design yet also talks the language and understands the constraints of business. This is the proposition of this paper, based on Norman's (2010) transitional engineer approach, the Authors' propose a new name for such a new role (*Design Innovation Catalyst*), in order to separate and distinguish it amongst the roles designers have played previously throughout history. The "*Design Innovation Catalyst"* (Figure 4) translates and facilitates design observation, insight, meaning, and strategy into all facets of the company. The definition of this role is to continuously instigate, challenge and disrupt innovation internally and externally from within the company, whilst re-aligning and mapping these activities back to the strategy of the business.

Capabilities of this new *Design Innovation Catalyst* will include:

- Design visualisation skills to enable communication and implementation of the visual design led innovation tools and processes
- Business knowledge and understanding
- Conversant in the language of business, spanning all areas, levels and departments of a company
- Ability to challenge the status quo and procedural processes within an organisation
- Creative problem solving skills
- Capable of translating ideas from the abstract to the concrete, and through to strategy
- Ability to challenge the fundamental problems that are assumed by companies
- Adaptable and capable of converging and diverging quickly and seamlessly
- Understands business process and modelling concepts
- Speaks from a position of authority
- Has a vision for growth and a passion for the organisation
- Belief in the customer values
- Facilitator of disruptive change from a holistic view

In order to bridge the capabilities identified above new knowledge and skills that fall outside the traditional role of design or business education is needed. This research builds upon these insights and highlights the need for a new organisational capability such as a 'design innovation catalyst' to be engaged by businesses when adopting the design led innovation framework. The Design Innovation Catalyst Framework is to be employed in an iterative cycle, engaging many different stakeholders in the process, tied together by the *'design innovation catalyst'* who is always measuring the concept against the central value proposition.

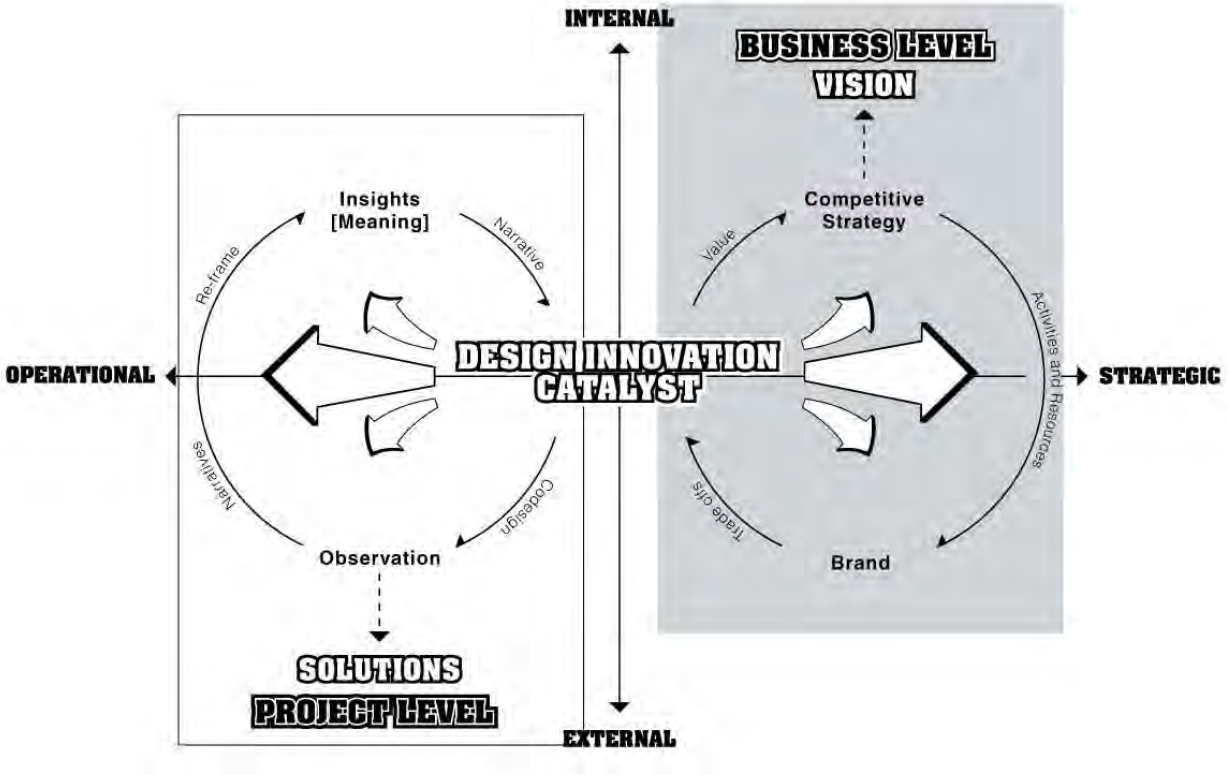

Figure 4 – Design Innovation Catalyst Framework

The authors believe that Universities are critical in meeting the needs to fill the organisational leadership gap in companies transitioning to design led businesses. Currently many new courses are being developed to assist in growing design thinking skills within business. These programs need to be expanded to focus on the gaps in organisational leadership identified in this paper. Universities are well positioned to take a leadership role in providing this new knowledge through practice based research activities. This approach to learning enables the awareness and capability gap to be addressed in one activity. The next step in this research study is to better understand how this approach can be achieved and scaled across organisations of varying sizes and capacities.

Working with companies during the initial exploration of this new framework has found that awareness surrounding the need for organisational leadership to successfully transition to a design led organisation, is low. Although there are early indications that the design thinking movement has highlighted the need to embed design capabilities within project teams, it is the Authors' opinion that these efforts are being diluted without addressing the identified gaps in organisational leadership. Efforts to address these organisational gaps and raise the level of awareness for change inside firms, is ongoing. This new role must be embedded within firms at the beginning of the design led journey and hiring a consultancy to fulfil these requirements will never work, as a cultural shift from within the company is imperative to its success.

SUMMARY

This paper presents a new approach to the traditional role of design within business and how educators might envisage creating such a professional. Questions were raised in regards to the transitional aspects of who could or should facilitate such a transformation within the design led framework. It was identified that design is not only about the aesthetics or functionality of products. Focussing on these will only encompass one variable of the business model and even although they are important, it is all aspects of a business model designed together that creates a real value

proposition. The current gap in literature on this topic indicates that more research is needed in this area. Investigating this emerging field of research to better understand the future of design at the business level requires new tools, techniques, procedures, capabilities, languages and new knowledge. The future of the design profession lies in the ability to couple the product, service, technology and experience together, designing in a conglomerate underpinned by fundamental human emotion within the overarching business model.

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Norman, C. Jerrard. B. (2012). *The Impact of Work-Based Learning on New Design Managers.*

THE IMPACT OF WORK-BASED LEARNING ON NEW DESIGN MANAGERS

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New research is described which explores the impact of master's level work-based learning on design managers and their practice. The roles of designers are explored together with the cultural gap often found between designers and non-designers. A review of learning styles and the nature of work-based learning provides a backdrop, which is further explored through the changing relationship between learning and higher education.
Graduates of the Master's in Design Management at BIAD, Birmingham City University, were interviewed to determine the nature and impact of their work-based learning.
The research found common learning and communication perceptions; important links between professional competence and experiential curricula, design thinking and innovation. Overall, the results indicate significant potential for development in university courses where work-based learning and shared curricula can possess great potency.

Keywords: Design Management; Work-Based Learning; Design Thinking

INTRODUCTION

The research in this paper builds upon earlier investigations conducted at Birmingham Institute of Art and Design (BIAD), Birmingham City University (BCU) which explored the high level and quality of design management skills that can be acquired through work-based learning (WBL), (Norman and Jerrard, 2011).

This earlier research was based on a sample of WBL Master's in Design Management students' experiences over five years and involved the analysis of work submitted for assessment, with a view to evidencing the level of acquisition of key design management skills.

The purpose of this latest research was to explore in-depth the impact of master's level WBL on individual design managers and their practice in the organisations they work in. Through both quantitative and qualitative analysis the research found high levels of achievement and the acquisition of core design management skills through WBL.

The Master's in Design Management at BIAD offers a flexible learning mode of study, based on the principles of WBL. Students study over a period of two years whilst continuing in their design related practice; their study is linked to the needs of both the student and the workplace, with module teaching, learning and assessment methods adapted accordingly.

The course addresses the need for design managers to develop specialist skills to bridge the *'gap'* between designers and non-designers, the particular nature of designers' learning styles and the principles of WBL in higher education. The degree to which this happens is the subject of the research detailed in this paper.

BACKGROUND

THE NATURE OF DESIGNERS AND THEIR ROLES

Designers often occupy novel, sometimes unique positions within companies; design managers are expected to not only support these positions but also encompass wider company cultures with appropriately broader skills. Whilst most designers enter the workplace qualified to at least degree level, their education will have prepared them for their roles

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as designers, not managers. Once in the workplace, designers tend to 'learn on the job' with management skills often being neglected, leading potential design managers poorly equipped.

At the heart of managing design is the individual designer. Designers aren't necessarily *'creative'*, although many other employees may be; but it is likely they will be *'artistic'*. Designers need to deal with discontinuity and complexity in their working environments (Veryzer, 2005) but generally are expected to innovate. They will not see themselves or their role as *'measurable'* even though their efforts often contribute significantly to the success of the company. Design groups tend to reference value within themselves; this is typically found in all professional groups. Indeed, design solutions which themselves vary from company expectations may be viewed, by designers, as independent. Traditionally, the designer is the free *'irreverent'* employee who alone appears to have specific personal engagement with his or her work. In directing design one is aware of the necessity to encourage designers to question and think (unlike many other employees) beyond the current scope to the company.

THE GAP

The distinctive nature of the designer's role and the cultural gap between designers and non-designers is well documented. Although there are many design-led organisations where this gap is not apparent, it remains clearly evident in others.

Whilst explaining the potential value of design thinking to innovation, Brown (2009:5) identifies the language gap between himself as a designer and the business world: 'I realised that I was approaching the world from a set of operating principles that was different to theirs'.

The management of this gap, the relationship between designers and non-designers, is central to effective design management and successful design outcomes. So, whilst design thinking is seen as an emerging discipline and increasingly being recognised by business, there remains a strong imperative for designers and design managers to acquire the language of business and the ability to link theory to practice (Kefallonitis, 2007). The Design Council and Creative & Cultural Skills (2007:28) reinforce this view, explaining that designers wishing to operate at a strategic level need to be able to: 'understand business drivers and markets and to work with senior management across a range of industries and disciplines'.

To narrow the gap it is important to recognise that designers have distinctive natures, they acquire knowledge and solve problems in particular ways. Where a designer tends to use a *'qualitative'* approach to solving problems, business tends to use a *'quantitative'* approach, so a design manager needs to be prepared to adopt a quantitative approach if they want to influence business decisions, (Green, 2004). McCormack (2004) describes how the cultural gap is exacerbated by different human natures and contrasts the emotional nature of design and designers with the dispassionate nature of manufacturers.

Clearly designers can be educated to fulfil their traditional role, that of an artistic creator. However, the complexity of working life means that such creativity may be undermined if the designer is expected to create in complexities beyond his or her imagination. If a designer is to acquire the knowledge and skills to manage, it is important to take into account their motivation, education and styles of thinking (Walker, 1990), and accommodate their distinctive learning styles.

DESIGNER'S LEARNING STYLES

During the 1970s, the concept of learning styles emerged with a number of models being developed and proposed as a means of informing teaching. Although there has since been criticism of the application of learning styles theory to teaching, the principles of Fleming's VARK model (Fleming and Mills, 1992) would seem to resonate with the practice of design management and the challenges faced by design managers when working with designers and non-designers.

Fleming identifies three different types of learning style: visual; auditory and kinaesthetic / tactile. Visual learners are believed to learn most effectively through what they see, auditory learners with what they hear, and kinaesthetic / tactile learners by touching and doing.

These learning preferences are not confined to education; they are equally applicable to the way information is assimilated in all aspects of life, including the workplace. Where design education's practice based teaching, learning and assessment strategies reflect designers' preferred visual and kinaesthetic / tactile learning styles, working within design communities can reinforce these. As a consequence it can be argued that a designer's education and working life in the design studio environment, where everyone communicates in the same way, polarises their learning styles and neglects their auditory learning skills. This may not pose a problem whilst a designer works within a closed design environment such as the design studio, however, if the designer wants to communicate effectively with non-designers then they may be at a disadvantage.

Concerning designers' ability to communicate with non-designers and the iterative nature of the design process, Schön (1983:viii) introduced the concept of practitioners' *'tacit knowledge'*, where: 'competent practitioners usually know more than they can say'. Schön (1983:49) expands on the meaning of tacit knowledge by describing the

nature of the practitioner: 'In his day-to-day practice he makes innumerable judgments of quality for which he cannot state adequate criteria, and he states skills for which he cannot state the rules and procedures'. Schön (1983:50) extends this to the application of theory to practice: 'Even when he makes conscious use of research-based theories and techniques, he is dependent on tacit recognitions, judgements and skilful performances'.

This tacit knowledge is attributed to the practitioner's ability to learn through reflection, and through reflective practice, which in turn is linked to Kolb's (1984) Experiential Learning Theory. Kolb describes the learning process as a cycle of four stages namely '*concrete experience', 'reflective observation', 'abstract conceptualisation'* and '*active experimentation'*. Through reflection the practitioner examines their experiences, and uses this process to make sense of situations and learn from their experience.

HIGHER EDUCATION AND WORK-BASED LEARNING

So where does higher education (HE) fit in the development of design managers' skills? In the early 1980s Schön (1995) first described the cultural *'rift'* between HE and practitioners, the relationship between theory and practice, and the question of intellectual rigour in professional practice.

The experiential nature of designers' learning, the tacit nature of their knowledge and the challenge they face in articulating what they know stand to reinforce this rift. However, these very preferences for learning by doing and learning through reflection lend themselves to WBL.

There are increasing numbers of educators questioning how learning takes place within universities. Also there are increasing collaborations between universities and industry where domains of shared values are also increasing. These issues, coupled with the changing nature of professional work suggest that WBL has an innovative and welcome role to play.

As a mode of study provided by universities, WBL can create the opportunity for design managers to develop high-level skills whilst also enabling them to continue in their full-time practice. Designed to meet the needs of learners and their organisations through formally accredited programmes of study, WBL accommodates the needs of individual learners through the development of individual learning plans, (Boud and Solomon, 2001).

Raelin (2008) describes how WBL merges theory with practice and knowledge with experience. This process relies on *'metacognition'*, the student's conscious (as opposed to sub-conscious) reflection on their work practice, with both individual and public reflection being essential to the learning process, so learning occurs during the process of doing and of *'expressing'*.

The process of expressing can take many forms, from informal discussions and seminars to formal assessments and can be enhanced through peer learning. Boud, Cohen and Sampson (2001:3) describe the value of peer learning where students: 'learn a great deal by explaining their ideas to others and by participating in activities in which they can learn from their peers'. The role of assessment is also central to expression and WBL enables assessment to be designed to reflect the needs of the learner and their workplace, as well as the academic expectations of the programme.

Learning within the workplace is complimentary to the way more formal elements are received. Such curriculum design is not simple, as it was suggested more than a decade ago: '…that the language of the creative arts is necessarily metaphoric, multi-layered, and qualitative, and that the rendering of multi-modal projects requires access to a range of meaning-making resources' (Doloughan, 2002:62).

Initially, WBL provided collaborative learning environments in association with small firms in Knowledge Transfer Partnerships (UK-based programmes enabling businesses to improve their competitiveness through university, employer and graduate partnerships). Research into the associated WBL process shows an unusual conflation of WBL, distance learning and supported self-directed learning. The operation of contracted WBL has provided unusual insights into interactions between university, student and employer since it was first researched (Anderson, Boud and Sampson, 1994)

A review of other contract schemes across higher education suggests that WBL brings together partners who are stakeholders in the outcomes of the learning. Employer involvement may vary, in some instances a workplace mentor is required and can be involved to the extent of representing the candidate in negotiations with the candidate's employers or the University where necessary. There are established WBL master's programmes at a number of universities throughout Britain, some have far more emphasis on the involvement with the employer, whilst others give more autonomy to the student, who is very much placed at the centre of their learning. The pathway for this type learning falls into four main categories ranging from optional modules to wholly WBL. The four categories are:

- An optional vocational module embedded within a programme of study.
- A negotiated programme of study that could be work related.
- A programme of study that is created from a selection of modules on offer within the university, including work-based modules.
- Wholly work-based programmes involving a partnership between employer, employee/student and university.

The framework for WBL may vary between institutions but consistent throughout is the accreditation of learning. The number of credits that can be gained through this process vary from institution to institution but can, in respect of some institutions, contribute to 100% of the overall award. Universities that are fully supportive of WBL have central units employing personnel who deal with the processes of negotiation and Accreditation of Prior (Experiential) Learning (AP[E]L), together with the tracking of the progress of the individual student. The contract within art and design environments, however, is relatively new and so particular care has been taken to consider both existing art and design practice as well as the use of contracts in other disciplines. This new situation prompted research into the value of WBL in this specific context.

RESEARCH METHODOLOGY

A detailed literature review provided justification for the research. A qualitative approach centred on the development of six detailed case studies, based on WBL graduates of the Master's in Design Management at BIAD who studied between 2007 and 2011. Semi-structured participatory interviews were recorded, transcribed and analysed.

Those interviewed were designers with design management roles, working in both large and small organisations in the private and public sector. Fifty per cent of the designers interviewed came from organisations where design is core to their organisation's products or services, the other fifty per cent were in positions where design could be seen as secondary to the organisation's core product or service. The designers had a range of levels of experience, with the most experienced having worked in design for over ten years, and the least experienced having joined the programme straight from graduation as part of a Knowledge Transfer Partnership. The participant case studies included:

- A former graphic designer with over ten years' experience, working as an account manager in UK local government.
- A spatial designer working globally in the financial services sector.
- A jewellery designer working for a UK based designer and manufacturer.
- A fashion designer working for a global apparel brand.
- A product designer who studied whilst working in design and manufacture between the UK and Hong Kong
- A graphic designer working in a small UK based manufacturer supplying the global music industry.

The changing student experience in the electronic domain, where learning is increasingly aligned to the learner's location and not the university building formed a challenging environment for the research. From the pedagogical and design literature a number of interview questions were derived surrounding:

- The opportunity to experientially research a complex learning domain.
- The need to research and develop new ways to study design.
- The emergent pedagogical issues relating to widening participation.
- The relationships between work and learning in new combinations.
- Individuals' experiential learning.

The design managers were asked about their motives for studying design management, how they view the role of design within their organisations, their preferred learning styles, how they managed their WBL and how they believe it has impacted on their practice and the organisations they work within. Intellectual capital as a form of exchangeable currency provided the focus for impact review questions (Gibbs and Garnett, 2007). The research was conducted with the informed consent of the graduates within the ethical guidelines of research at Birmingham City University.

FINDINGS

MOTIVES FOR STUDY

Participants saw the Master's in Design Management as an investment in their future careers, in some cases this was based on their belief that they had progressed as far as they could using their design skills and would not progress further without acquiring what they generally described as business and management skills:

> *I was stuck in a rut, I'd been working as a designer for about 10 years…I wanted to lead a business or run a business in due course.*

> *I didn't feel I had an appreciation of business that was necessary to grow and expand my career.*

Participants described the development of their design skills through years of design practice but were concerned by the lack of guidance in the development of their management skills, they joined the course to gain access to guidance, management theory and principles:

> *I had to learn everything from experience, I didn't actually read about design management or how you manage people…after eight years working in industry I needed an answer.*

> *Say if you did an MBA, you would have that ability to step back and understand…I wanted to understand management techniques and why they are applied in a particular way at management level.*

The participants were looking to develop personally, to develop their management skills and gain access to knowledge around strategy, marketing and business in general, in some cases they believed they were isolated from the rest of the organisation and needed these skills and knowledge for their careers to progress.

DESIGN MANAGERS' VIEWS ON DESIGN'S RELATIONSHIP WITH BUSINESS

The isolation that some of the participants described was reinforced by almost all the participants' views about the role of design in business, all but one interviewee expressed powerful views about the *'gap'*. Reflecting on difficult experiences, there was a distinct theme of designers' early career naivety, their expectations of a design centred world and a lack of understanding of design's relationship with other business and organisational disciplines:

> *I thought that design would be the driving force, as it were, that we were the important people!*

For some early career designers the way businesses view design had been quite shocking, their design education had focused on the design world, they expected design to be at least on a par with the importance of other parts of the business, when in fact this wasn't always the case. Having said that, one design manager based in Hong Kong seemed comfortable with the differences in business disciplines, seeing them as: 'helpful and normal', and linked the need to manage cultural differences in business to the East West cultural differences he also has to factor into his practice. One interviewee's account of his graphic design career to-date captures the full breadth of potential experience through his account of two contrasting work environments, he describes his first position working for a multinational print company:

> *In this environment, the role of design was reduced to a mere process of designing and outputting as quickly as possible, in an acceptable state…as opposed to designing with due passion, consideration and intelligence, as was taught in university. It was a reality check that shattered my rose tinted view of the role of design in business.*

However, a change of position to a small, design-led manufacturing business introduced him to a completely different culture:

> *It was a breath of fresh air and liberation from my previous role, I observed senior management genuinely passionate about design and all its intricacy, pit-falls and potential.*

This recognition of the culture gap was linked to the participants' acceptance that the business world thinks and communicates differently to the design world. At an educational level, emergent acceptance of this is often elusive; the authors would contest that success of new entrants to a company from design management courses cannot be easily predetermined without the experience of WBL.

PERCEPTIONS OF LEARNING AND COMMUNICATION PREFERENCES

When asked about learning styles and their preferences, the design managers demonstrated limited awareness of these, this may have been due to the terminology so they were prompted with examples, which enabled them to discuss how they believe they learn.

There were strong preferences for 'learning by doing', taking a practical approach and being 'visual'. The visual and practical emphasis of design education was described, with design projects and assessments being practical but also research being conducted visually through the development of mood boards and similar.

Commenting on the workplace one designer identified the difference between visual and non-visual people and the challenge this poses, describing the difficulty of communicating with 'number crunchers':

> *They're reeling off numbers and I'm thinking 'I have no idea what that is! What does it look like? What colour is it?*

This vulnerability of the designer when communicating with other disciplines that are often the decision makers was further demonstrated by one designer's account of how over time he had changed, how he had learned to use language to influence people:

> *I think I've improved a lot in the way I use language now and how I communicate with people, so rather than getting all angry and panicky, I communicate.*

Throughout the interviews the design managers expressed a lack of confidence arising from their early experiences as designers and a clear desire to be able to communicate with other disciplines on equal terms. Such eagerness chimes with newer interpretations of Kolb's learning cycle in management education (Vince, 1998) and also highlights the newer application of Donald Schön's practitioner reflection in design teams (Stempfle and Badke-Schaub, 2002).

MANAGING WORK-BASED LEARNING

Work based students can be isolated, apart from an initial lecture programme, contact with other students is often minimal and meetings with tutors can be difficult to arrange, particularly if the workplace is a distance away, or even in another country. The degree to which a WBL student integrates their learning cannot easily be engineered without the regular contact, support and encouragement of the university.

The opportunity to study whilst remaining in full-time practice was seen as essential by the participants, it is unlikely that they would have interrupted their careers for full-time study. Although the postgraduate study added to their workload, and at times it was difficult to reconcile the competing demands of work, study and personal life; this was seen as acceptable and part of their investment in their futures.

The participants contrasted the value of WBL with a more theoretical approach, expressing a strong preference for the application of theory to real life problems in the workplace, developing tangible solutions, learning through evaluation and reflection:

> *Research for a purpose with actionable outcomes that genuinely benefit business rather than research for assignment grades' sake.*

In several cases the participants described how the management principles and analysis tools they researched during the course were often approaches that they had encountered in the workplace but had not recognised as being formal processes:

> *You're already undertaking a number of these activities or tasks but you're probably just calling them a different name, you're probably not really implementing them as you might.*

> *I think that people do a lot of these things naturally but are now doing them in an enhanced way, with a higher level of consciousness.*

The identification or naming of management theories and understanding how they can be applied had given the design managers insights into the business process, providing frameworks and structured approaches that they could articulate and explore through their own work.

The design managers had all integrated work related problems into their study and observed that where the workplace often fails to make time for reflection (unless there has been a problem), their study had created the opportunity to develop their reflective practice:

> *The thing I found most useful was the time for reflection, taking time, stepping aside, thinking about it and coming back to it.*

With regards to the role of assessment, two of the participants described the value of assessed presentations or: 'standing up in front of your peers' as extremely valuable. Firstly as a test of the ability to present a coherent argument when exposed to: 'people who think in a different way and are challenging in their thoughts', and secondly, as a formal reflection process and means of capturing what has been learned.

THE IMPACT ON PERSONAL PRACTICE AND THE WORKPLACE

All the participants described their study as having given them increased confidence, with references being made to feeling more valued, more in control and feeling 'less intimidated', especially when dealing with highly qualified colleagues or senior management.

This increased confidence was attributed to being better informed through research, familiarity with business: 'tools and techniques' and the ability to apply these tools, as one design manager observed: 'I've got the missing pieces of the jigsaw now'. Another interviewee explained how the involvement of the University had added credibility to her work, with the result that the employer was willing to provide greater freedom for research and to put new ideas into practice.

The design managers described how they had acquired insights into the business perspective and what their organisations needed, which in turn had led them to become more effective communicators: 'my communication skills and confidence rocketed, like threefold'. Participants described themselves as more articulate, adapting the way they communicate to the audience, and being: 'more in tune with the language expected':

> *It's got to be quick, clear and concise… otherwise you're wading through piles of information, they get bored and walk off!*

The ability to take an evidence-based approach and articulate ideas in terms that other disciplines can relate to led to significantly increased confidence and effectiveness. One interviewee described how the master's had equipped him with the insight necessary to understand the relationship between design and business and to be able to articulate: 'design reasoning and solutions to business people who are not trained to listen to designers'.

Overall, the participants saw themselves and their outlooks as changed, these changes being attributed to both the master's and their progression into more design management focused roles. They described different approaches to their work where they are 'not as insular', collaborating with other disciplines, being more business oriented and seeing themselves as part of the whole business. Bridging the cultural gap.

CONCLUSIONS

Higher education, in adopting and committing to WBL will need to recognise new learning locations for a student. The recognition of shorter, non-linear student pathways which co-benefit employers, is needed. Also the use within HE's portfolio would be the adoption of greater flexibility in negotiation for study. This is perhaps an ideal use of contracted learning, where a collection of *'bite-sized'* learning episodes are packaged around the learner but within the existing module or credit framework offered by the university. WBL has the potential to transform the HE environment and positively silence the critics of universities where the ivory tower criticism features. However, despite such enthusiasm there now needs to be more research into the longer-term impact and value of WBL particularly for universities offering design degrees.

From this research it is clear that WBL improves the value of higher education without altering its perceived purpose. It is also clear that the design industries constantly require a development of knowledge capital and an empowerment of those working in design. In order to do this they will need to adopt a practice of organisational learning themselves. Overall, in order for a design company to become a learning organisation it will need to align entrepreneurial actions with those which build capacity. In this way, rather like universities, a more flexible approach should be used in relation to knowledge and its business potential.

Whilst WBL may be seen as liberating it is also important to promote the responsibility of the individual, as Slayton (2002:231) originally stated: '…a literal displacement of the individual into an environment of associative relationships establishes a form of authorship in which there is no singularity of ownership, origination or directorial oversight'. This appears to be confirmed.

The research also indicates that there are links between professional competence and experiential curricula. The potential to represent professional life within the existing university course has been significantly enhanced by the integration of the 'external curriculum' found in WBL. This is not new, however within design teaching the professional operation of designing and its management is significantly enhanced through WBL. Furthermore such an experiential approach appears to stimulate on-going innovation in the organisation.

Universities have to not only recognise the external curriculum but to carefully, seamlessly integrate a learning process within it. The research found that there were specific links between the experience of WBL and the new managers' ability to work in professional roles. Thus there was found a precise link between design thinking and innovation. In particular the ability to innovate appears to be specifically stimulated through prior knowledge of real design problems and professional environments.

Participating organisations should acknowledge that learning takes place everyday within their organisation, learning which develops new, valuable knowledge. Harvesting such knowledge is a systematic process, often stimulated by a graduate with new investigative skills, placed within a company.

The important innovatory role that design and designing takes is through establishing connections between previously unlinked project elements. WBL represents an opportunity to share and benefit from new innovative design knowledge.

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MASTER'S DEGREE IN STRATEGIC DESIGN AND INNOVATION AT UNIVERSIDAD IBEROAMERICANA MEXICO CITY

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Graduate programs are required with the potential for innovation that Mexican society requires. Universities should be able to deliver a better systemic, holistic Design education with interdisciplinary approaches.
Nowadays the integration of diverse disciplines is a powerful alternative for improving the correct understanding of Mexican family business problems and generating design strategies that lead to innovation. Traditional views are insufficient to overcome the contemporary global crisis; therefore it is necessary to support the development of complex thinking and design management transformation processes.
Our Master Degree in Strategic Design and Innovation, based on a core of interdisciplinary studies, educates marketing managers, communicators, designers, architects, business administrators and engineers, to be able to address problems of greater complexity and promote innovation in a broad sense.

Keywords: Design education; interdisciplinary work; innovation.

INTRODUCTION

Nowadays, innovation is one of the most recurrent subjects in business literature; nevertheless, several authors of the business thinking throughout history have written about such subject acknowledging the decisive and transcendent importance that it has over the economic development, generation of value and financial growth processes.

Innovation depends mainly on the capacity of an organization to internally generate knowledge and transform it in differentiation values. However, in Mexico business strategies have not been able to completely go beyond disciplinary barriers, to reconsider traditional paradigms and generate innovation due to the particular interests of a family, a company or entrepreneurs, which may not be aligned with the real, needs of the business.

Although Mexican designers can come up with creative concepts that are better fitted to the local consumers´ desires and preferences, unfortunately just a few can explain, justify and sell the financial impact that their work has in the business landscape and in the social and cultural development of our country.

The contemporary Mexican designer's work consists of understanding the complexity of users and family-owned companies to visualize different possibilities of action. A good user centered design provides products and services with various differentiation, personality, character, sustainability, emotion, satisfaction or communication values that are well regarded by consumers and companies.

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Our Master in Strategic Design and Innovation educates professionals, from different backgrounds, for the generation of knowledge that necessarily requires openness for interdisciplinary visions and teamwork. Our goal is not to train “specialized design managers”, but to connect and integrate several academic schools of thought, professions, and practical skills to be applied to a wide range of innovative activities in organizations engaged in the trade of goods and services. This approach implies the use of knowledge and techniques developed in other traditional fields of study such as social sciences (anthropology, sociology and psychology) or administrative (business strategies, economy and marketing) to generate strategically innovation in a broad sense. This graduate program, started in 2006, has been a great contribution for Mexican enterprises.

DESIGN EDUCATION AT UNIVERSIDAD IBEROAMERICANA, MEXICO CITY.

Universidad Iberoamericana is a private, non-profit institution, open to all faiths and nationalities. Its primary purpose is to form integrated, rather than solely informed, human beings through intellectual growth and self-realization. This implies creativity, the capacity to think critically, and the freedom to assert and establish one's own goals.

Universidad Iberoamericana is inspired by Christian values, and seeks to integrate them with the philosophic and scientific advances through an attitude of permanent intellectual uprightness and the search of Truth. It emphasizes the promotion of the interdisciplinary dialogue as a tool for a higher academic quality.

The first program of Industrial Design in Mexico and Latin America started at the Universidad Iberoamericana 57 years ago (in 1955). The Design Department was officially created in 1963 and since then, it has grown to become one of the most dynamic departments in the University. We believe that design is an important factor of social development and should become an integral part of the multicultural and multiethnic Mexico.

OUR VISION

We educate designers capable to analyze their social, economic, political and cultural context, in order to propose and produce pertinent design strategies, based on the integration of the following aspects:

- Innovative approach
- Strategic and competitive approach
- Systemic and prospective view
- Sustainability view
- Interdisciplinary work
- Social conscience
- Ethical attitude

While practicing the design profession with a sense of service to the others, aiming to improve the quality of life of human beings

OUR MISSION

The Design Department is committed to promote and collaborate with the development and education of its members (students, faculty and alumni), in order for them to be able to serve Mexico, through the planning and implementation of design strategies that will impact the conformation of valuable products, services and processes.

OUR GOALS

- To provide an interdisciplinary and qualified design education to our students that will develop their abilities to think critically, solve design problems effectively and work actively in the sustainable development of Mexico.
- To broaden perspectives in order to visualize alternative types of work that will allow our students, faculty and alumni, to participate in the construction of a fairer Mexico.
- To confront the pressing problems of our country in an appropriate manner by using alternative methodologies and by trying to obtain an overall view of the social impact of the professional design activity.

What distinguishes our Design Department is a successful relationship between design theory (critical analysis), practice (synthesis), management (implementation) and innovation (user's research) that is carried out each semester at all the design core courses.

OUR FACULTY

The areas of expertise of our Design's faculty form the foundation of very strong undergraduate and graduate programs. Each of those programs has a perfectly balanced staff (part-time and full-time professors) of highly qualified designers, all of whom come from diverse university and professional experience backgrounds, representing ideas from various regions of Mexico, Latin American and the world. Our 200 professors differ in cultural background, design education and professional practice experience and are practicing artists, designers (from different fields), engineers, architects, illustrators, photographers, historians, managers, entrepreneurs, researchers and educators as well as specialists in various fields of art, technology, business, anthropology and strategic design.

INTERDISCIPLINARY DESIGN GRADUATE PROGRAMS AND THE IMPORTANCE OF ITS CREATION TO MEXICAN ENTERPRISES

Today the lack of strategic design in Mexico affects first of all the enterprises' profitability, particularly micro, small and medium companies, which mainly are family-owned and invest very little in the improvement of its competitiveness through innovation practices.

Unfortunately many Mexican companies still support their competitiveness in strategies centered on low cost of operation and production. PhD. Luis Arnal, alumni of our Design Department and PhD graduated from IIT in Chicago, explains that: "innovation is currently a priority subject: almost all businesses compete in the international scene based on their own capacities to innovate. This does not mean to be the "most creative" company, but to offer new goods, introducing adequate strategies of differentiation, that represent clear benefits to the potential consumers".

There are several critical factors for a successful business performance in the global scene, such as user's research, product and service differentiation, marketing, brand positioning, relationships and costumer services, among others, which necessarily imply an investment and to cross traditional boundaries. Given this reality, micro, small and medium domestic enterprises, with limited resources and budget, are at a great disadvantage and have few opportunities available to survive in the local market.

Mexican enterprises can develop, through innovation, new bases for competing, redefining traditional schemes, using methods and insights of several established disciplines. Design, understood as a creative interdisciplinary process that seeks to solve problems concerning the development of valuable products, services and processes, can effectively contribute to the implementation of innovation practices in Mexican business culture.

Given this complexity, the Design graduate programs in Mexico should be more attentive to the local business and social demands, unsolved for years, which may not be addressed without combining the approaches of several disciplines, balancing the differing interests and practices successfully.

This fact requires both professionals and researchers with new and numerous skills that can share their approaches and transform them to creatively contribute to the solution of our socioeconomic problems, providing new knowledge for people and enterprises.

New graduate programs are required in this scenario with the potential for innovation that Mexican society requires. At universities we must be able to promote a systemic, holistic Design education with both disciplinary and interdisciplinary approaches that may be seen in complementary relation to one another.

The complexity of Mexican family-owned business' phenomenon requires research, analysis and synthesis across economic, social, cultural and environmental spheres, as well as an integration of multiple social and natural science disciplines. This is possibly the only way for these companies to grow and innovate through the adoption of professional design advice and knowledge management models.

By a clever interdisciplinary collaboration, valuable action opportunities can be identified, structuring pertinent and feasible design strategies that provide a solution to the different problems of the organizations such as communication, conflict resolution, family systems, leadership development, management development, etc.

During the last two decades in Mexico we have experienced the harmful effects of excessive specialization, probably interdisciplinary work will enables us to tackle the local enterprise' problems with an attitude of openness, respect, service and cooperation with other professionals that share the same business and design challenges.

SPECIALIZATION VS. HOLISTIC VISION

Probably one of the problems of late modernity was hyper-specialization, as noted by Jürgen Habermas (1984). Broadly speaking, this author describes the 'project of modernity' thought structured knowledge in three main spheres: science, morality and art, each with its own objectives and means to apply its results to society.

By structuring knowledge in this way the intention was to establish in turn, means to interrelate the three main spheres; however, the development of an instrumental rationality has generated a multitude of fields that can only be understood and treated by specialists, so that participation of society in shaping lifestyles and ways of thinking has been severely limited. Rationality was the key both to domination and to emancipation (Habermas, 1981).

One possible mechanism to reverse this situation, and change business paradigms, is introducing an interdisciplinary attitude and beyond this, the possibility of reintroducing common aspects that lead to holistic views in the various fields of knowledge.

Today the integration of diverse disciplines is a viable and powerful alternative for improving the understanding of social problems and generating viable design strategies that lead to innovation. It seems that partial views are insufficient to overcome Mexican crisis; therefore it is necessary to encourage the development of complex thinking (Tackara, 2005).

However, without the help of different specialists, interdisciplinarians such as design strategists would not have access to the necessary information, methods and knowledge as well as the help and advise from leading experts to develop successful projects.

We are experiencing that interdisciplinary collaboration and research may result in creative and profitable solutions to local business problems. It is preponderant to get Mexican designers to be part of the senior management teams that outline development strategies in small and medium enterprises. The inclusion of design professionals in these decision-making teams is relevant today, since in most cases business strategies are generated without an end user's view (in its physiological, cultural and psychological dimensions), and managers are mainly focused on enhancing business processes to increase productivity.

Unfortunately the introduction of new interdisciplinary graduate programs is perceived sometimes as a competition for other traditional disciplines. Companies required entirely better and improved goods and services to meet the rapidly changing consumer demands. Designers generate better products and solutions that may help differentiate the business from its competitors, but only with a real interdisciplinary teamwork Mexican companies will increase its perceived value to their customers and markets and develop alternative development models within the business.

STRATEGIC DESIGN: A VIABLE CHALLENGE FOR MEXICAN COMPANIES

Nowadays, big enterprises hire people for their directive staff, with different discipline and professional profiles to develop, as a team, innovative projects. Interdiscipline has become the new business model that seeks to break the traditional management schemes to identify opportunities for competitive advantages, improving productivity, reducing costs and increasing profitability.

Lately, authors such as Tim Brown (2009) Roger Martin (2009) or Thomas Lockwood (2010) have proposed new paradigms, in which the design process is acknowledged by entrepreneurs as a useful tool of feasible adoption to get the desired innovation in business. Unfortunately innovation is still seen very risky in Mexico, but the possible benefits that companies may gain from it can be critical for their permanence and future success.

These current visions (design thinking (Brown, 2009), emotional design (Norman, 2004), service design, and experience design, among many others) are empowering designers to collaborate with enterprises in the research and understanding of their consumer’s desires and needs and to prospect the scenarios from which the new products and services are conceptualized. This dynamic is only possible from an interdisciplinary point of view, which allows the design integration with different areas and processes of a business.

On the other hand Mexican designers who are interested in defining positioning strategies for small and medium enterprises will have to better manage and communicate their proposals, to generate collective knowledge, to work in multidisciplinary teams and establish new partnerships and relationships, to promote interdiscipline and group decision making to build together with companies a virtuous and continuous learning cycle.

They will also need to deliver and implement tools and transformation processes to generate innovative solutions, improving business performance. Mexican designers in this scenario must be capable to develop and implement new concepts, products and processes, either through incremental changes or with radical ideas. This will require clever design research (Laurel, 2003), extensive ideation, exploring and continuous experimenting through prototyping, taking risks and thinking laterally.

INTEGRAL DESIGN EDUCATION

Companies are the primary agent for innovation in Mexico, unfortunately only a few of them have the right structure or conditions to successfully implement it. Innovation is one of the most undertaken themes in the contemporary design and management literature, but there are few texts focused specifically on Mexican family business.

As it was mentioned previously there is lack of collaboration between the existing design graduate programs and enterprises in Mexico. The relevance and impact of research is left to each faculty and researcher, falling sometimes in reductionist views.

Until the last century the global trends of research tended to some "discipline" customization in the margins of global knowledge and latent needs and problems that are urgent and local.

Unfortunately there are few Design graduate programs worldwide where the visions of academic, social, and local business organizations are shared and discussed. Our country is experiencing a shortage of collaborative work and a confusing design work demand.

The graduate programs' evaluation and accreditation (national and international) processes focus only on quantitative information such as terminal efficiency, the faculty's academic degrees, and so on. Today it is necessary to give a greater emphasis on qualitative education and application processes of the skills that design graduates should have in their professional practice.

APPLIED DESIGN RESEARCH

There is a latent need for "new means" to research and produce knowledge which is not only exclusive to universities. Design graduate programs should focus on the solution of complex problems, which are not framed within a structure of a discipline, but transdiscipline.

Focused on discovering the particular demands, needs and desires of the different tribes of costumers, and the possibilities of production and commercialization of organizations, designers can define, prospect and develop better goods, processes and services.

At our Design Department we are working on solving various social problems (with small enterprises, corporations, government or non governmental organizations) in close interaction with many actors. In this way we promote a greater social responsibility for emergent learning processes and knowledge.

There are very few multidisciplinary graduate programs under the traditional academic-administrative structure of Mexican universities. It is possible (and desirable) to build new interdisciplinary graduate programs, if the needs and priorities of the various social, public and private organizations are truly considered. It is important to state that knowledge generation has traditionally limited the academy's scope.

The recent efforts conducted in our Department to link design education with industry are headed in that direction. Therefore, the progress of knowledge, ultimate purpose of any research and graduate program, finds possibilities for development and growth outside the walls of universities. For more than fifteen years we have linked our design education with Mexican society through "linkage projects". This scheme has allowed our faculty and students to interact with different organizations through the resolution of complex problems.

We have collaborated with companies and organizations in different aspects:

- Socio-economic analysis: promoting a culture of citizen participation.
- Product and service development: innovating through user centered research.
- Communication and culture: creating visions, promoting best practices and values.
- Human rights: defending and promoting human rights.
- Sustainable economies: responding to the environment, developing businesses and curbing unemployment.
- Improving quality of life: developing better services for people living in poverty.
- People and the environment: fostering a respectful attitude to the environment.
- Health services: promoting a culture of holistic health and nutrition.
- Community projects: collaborating with community centers, cooperatives and organized groups developing projects for deprived sectors to overcome poverty.

Never the less new policies and models of design management, design strategy and design research adapted to Mexican business culture are still required. This can foster a new production of relevant, effective and efficient design knowledge and innovation for our country.

MASTER'S DEGREE IN STRATEGIC DESIGN AND INNOVATION

Mexican business problems are everyday more complex and require a real collaborative work to get solved. The Design Department at Universidad Iberoamericana has been encouraging *out of the box* thinking providing new learning models for innovation processes. We want to educate committed professional designers that will be able to prospect strategic solutions for the different

domestic problems. We are giving our students the opportunity to work in an interdisciplinary way and help them locate and understand themselves in the reality of a country of an enormous complexity, immerse in a society of great economic contrasts and part of a globalize world.

Our Master's Degree in Strategic Design and Innovation educates designers (from different fields), communications specialists, business administrators, marketers, engineers and architects to be part of the teams that trace the enterprises' development and innovation strategies.

A graduate from our Master's Degree program must:

- Have a high capacity to analyze, with an innovative and interdisciplinary perspective, the problems related to the development of products, visual communications and services.
- Be capable to apply qualitative research methods centered on the user, for creating visions and conceiving concepts.
- Have the capacity to understand and evaluate, from the perspective of strategic thinking, the impact of proposals and projects, on local enterprises and communities.
- Have the capacity to propose and develop strategies aimed at the development of enterprises and organizations, based on design thinking and centered on the user.
- Have a clear commitment to Mexico, Latin America and the rest of the World.

This Master's Degree started at our university in fall 2006 and has allowed our Latin-American students to look at the regional business landscape from a holistic viewpoint that is necessary for the development of radical innovations. We have had students from Mexican provinces, Argentina, Brazil, Colombia, Guatemala, Honduras and Venezuela. With dozens of graduated students we have been communicating the benefits of Strategic Design to Mexican society. Obviously the challenge of inserting innovation and design management practices into the Mexican business culture is still huge.

In 2007 an agreement with Universidad Rafael Landívar in Guatemala was consolidated in order for our Master's Degree on Strategic Design and Innovation to be imparted in the aforementioned institution. The program began there in 2008. The first class of fourteen Guatemalan students graduated in 2010.

After six years of our launch, we have graduated more than 50 design strategists capable to carry out research and management activities in the process of business and social innovation. Actually our alumni are holding positions as Marketing Directors, Design Managers or Design, Project or Product Managers, UX Researchers, Brand Managers Directors in medium companies, and Design and Innovation consultants for small firms.

CURRICULA

Our Master's Degree in Strategic Design and Innovation is looking to support small and medium companies and big corporations to innovate and compete successfully in the local and global scene. Our curricula is concerned not only with the formal definition of products and services, but also with the design thinking process, the user's research, the company's organizational structure, different management processes, the ideation, generation and communication of strategic solutions, all these requiring an extensive interdisciplinary vision.

Our full-time, two-year's program has a flexible academic structure, with four night classes per week, which allows our students to continue working (executive scheme). The program is divided in 82 credits (160 hours of instruction per semester).

Unlike other traditional Mexican Master's degrees in Design, our approach implies the use of a range of knowledge and techniques developed in other areas such as social sciences (anthropology, sociology and psychology) or administrative (business strategies, marketing) to develop innovative projects for companies (see table 1).

At our core courses in Strategic Design (see table 2) we incorporate, in real projects linked with enterprises and NGOs, design thinking, design research, service design, co-creation and

sustainability frameworks. We also offer our students interdisciplinary perspectives on Mexican business culture, domestic industry, local consumers´ behaviors, management, branding, leadership, entrepreneurship, sociology and communication, on courses that are shared with other Master's programs offered at our university (see tables 3 and 4).

Table 1 Master's Degree in Strategic Design and Innovation – Curricula Organization

Core of General Studies in Strategic Design	Interdisciplinary Studies (from other fields)	Electives	Total Number of Credits
38 credits 47% of credits	32 credits 39% of credits	12 credits 14% of credits	82 credits

Table 2 General Studies in Strategic Design

Strategic Design and Innovation I	Principles of Innovation, Strategic Design and Design Thinking applied to business.	6 credits
Strategic Design and Innovation II	Methods and techniques related to innovation. Design Management.	6 credits
Strategic Design and Innovation III	Case studies of Strategic Design. Application of knowledge and methods to the solution of real business problems.	6 credits
Strategic Design and Innovation IV	Case studies of Strategic Design. Application of interdisciplinary methods. Preparation for the Final Project.	6 credits
Symbolic Culture and Design	Designers as creators of symbols. Interdisciplinary relationship between Anthropology and Design.	4 credits
Final Project	The final project can be orientated towards the analysis and solution of a real problem or the analysis of theories from other fields.	10 credits
Total Core		38 credits

Table 3 Interdisciplinary Studies

Analysis of Contemporary Environment	Impact of globalization in Mexico from the point of view of enterprises, economy, society and culture.	2 credits
Semiotics	Theory of Icons, Signs, and Symbols. Principles of Rhetoric analysis. Hermeneutics.	4 credits
Business Management	Analysis of the interrelations of the different factors that conform an enterprise. Research and analysis of financial and social factors.	4 credits
Prospective and Scenarios	Methods and techniques used for prospective analysis and scenario design.	6 credits
Strategic Planning	Mission, vision and objectives in Strategic Planning. Analysis of Strategic Planning from a holistic view. Financial viability.	4 credits
Anthropology of Industry and Enterprise	Industrial Anthropology. Changes in industries due to information processes and its effect on business culture.	4 credits
Consumer Behavior	Consumer behavior and its relationship with Marketing and Branding Strategies. Review of factors involved with consumer's decisions.	4 credits
Brand Strategy	Brand Management from the point of view of enterprises and consumers. Lifestyle and values related to brands.	4 credits
Total Interdisciplinary Studies 8 subjects		32 credits

Table 4 Electives

Design and Consumption	Analytical studies about the relationship of design, marketing and culture.	**4 credits**
User Centered Design	Methods to explore the relationship between user behavior and the design of strategies. Co-Design. Co-creation.	**4 credits**
Communication and Culture	Analytical studies about the relationship of the creation of meaning and culture. Products and services as symbols.	**4 credits**
Socio-technical Systems	Studies from the anthropological standpoint about Innovation and its impact on business and culture	**4 credits**
New Business	Financial and legal aspects of business in Mexico. Entrepreneurship.	**4 credits**
Human Behavior	Consumer's psychology, related to marketing. Qualitative (ethnographic) marketing strategies. Tribes.	**4 credits**
Total Interdisciplinary Studies 4 subjects		12credits

COMPETENCIES

In order to clarify the performances, which are envisaged as results of education and integrate them into our curricular design, the ideal graduating-student profile was based in terms of the following six basic generic competencies:

a. Communication

Interact honestly and effectively, at the interpersonal or group level, in various contexts and with different codes, using the most suitable tools necessary to communicate strategic design projects.

b. Intellectual Leadership

Tackling complex phenomena and making significant and useful contributions to society via the efficient, responsible wielding of knowledge, intellectual skills and methodologies that make it possible to discover new opportunities for the advancement and application of knowledge in different social and business contexts.

c. Organization of people and the carrying out of tasks

Exercising collaborative leadership via personal and administrative skills in order to carry out individual and teamwork with the correct attitude to manage complexity.

d. Innovation and Change

Designing, proposing and carrying out, with a 360° viewpoint, new strategies to transform and improve Mexican situation, and being able to adapt to diverse situations.

e. Global humanistic outlook

Possessing an all-inclusive viewpoint, which, founded on personal dignity, helps to understand and solve social problems so as to engender more just and fully human conditions.

f. Self-management

Seek personal and professional development through reflection, discernment and dialogue, leading to an autonomous, committed and congruent life project. Personal entrepreneurship.

CHALLENGES

At our Master's Degree we are faced with a great challenge: the conceptualization of innovating goods, services and processes may be the key for the success of Mexican small and medium enterprises, but without openness to interdiscipline it is impossible to get it. Any design strategy must be correlated with corporate visions and plans.

Our graduate students will need to promote the integration of design, with the strategic vision of companies and conduct a great teamwork. It is important to develop interdiscipline together, with family owners and directors, to boost a long-term success in an enterprise, because even though it is relatively easy to imitate a "winner" good or service, it is really complex to compete with an innovating, well structured, long term business strategy.

Strategic designers have to communicate, at each level of positions, organizations and activities, the benefits of user centered research and co-creation to generate new business insights and opportunities, that can be transform into competitive advantages. The challenge of inserting strategic design into the Mexican family-business culture, in the next years, is huge.

Our alumni will need to improve their actual collaboration with different companies to transform strategic design into a catalytic, interdisciplinary and innovation generative tool that will make business processes more profitable, formulating clever solutions for the top management level.

CONCLUSSIONS

The professional practice of Design in Latin America is in a state in which the urgent need to promote design as a tool for business innovation is stressed. Mexico needs a new generation of creative leaders.

Our Master's Degree in Strategic Design and Innovation is seeking to contribute to the solution of current problems in the domestic business sector and extending the culture of design and innovation to the whole Mexican society with different actions:

- Promoting interdisciplinary synergies as driving forces for enterprise innovation.
- Providing differentiation tools for medium, small and micro Mexican enterprises.
- Integrating knowledge of social, economic, cultural, political, technological, market and design aspects to the micro and small Mexican enterprises.
- Incorporating strategic design as an effective tool in solving business problems.

Our program was pioneer in Mexico, integrating different perspectives of creative thinking, business strategy, sustainability, culture, entrepreneurship and leadership into a holistic interdisciplinary work.

Nevertheless Mexican designers still need to deepen in the field of strategic thinking, to expand their possibilities as consultants in the work field, not only in terms of "solving design problems," but generating innovative proposals that propose new approaches, strategies, goods and services, which enable the region's micro and small enterprises to conduct proactive development efforts and not just survival reactants.

The inclusion of strategic designers in the business development and innovation teams is vital today. The history and experience of different enterprises has shown that traditional design perceived, as a cosmetic tool is no longer enough to generate a competitive edge, we need professionals capable to formulate strategies, considering different perspectives.

The ruling conditions in Mexican enterprises, facing the globalization process we live in, require a different view, focused on innovation and design and not only in the production or sales. Local micro and small firms should deepen in the detection of needs to generate new business

opportunities instead of making the traditional management assessments to propose only improvements, modifications or redesigns.

Our Master's Degree is an ambitious educational project that is positioning strategic design and innovation practices in the Mexican business culture. We visualize the transformation of "design" into a strategic, catalyst and innovation generator tool, which empowers businessmen to respond to local and global "threats" and "opportunities" while supplementing possible "weaknesses" with collaborative practices and interdisciplinary views.

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OPPORTUNITIES FOR INTEGRATING DESIGN MANAGEMENT INTO EXECUTIVE EDUCATION

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As design thinking became a buzzword of recent business area, it is necessary to investigate whether it is actually reflected in academia as well as in practice because business schools are the place where real performers are educated. After historical review about the education of design issues in management academia, this study focused to EMBA programs as they could be more flexible to practical issues targeting current leaders. Top ranked EMBA curricula from three regions have been surveyed, but they still represented high entry barriers. Meanwhile, not major but four remarkable EMBA programs and three cases of non-degree executive education which actively integrating design subject have examined. Consequently, three models of design integration in executive education have defined which could be referred for further improvement according to the condition of business school.

Keywords: Design management; executive education; model of design integration

WHY DESIGN ISSUES IN BUSINESS EDUCATION?

As the world is being globalized, and the economy has shifted from industrial society to knowledge and service society, the objectives of innovation are no longer just physical products; they are new types of processes, services, interactions, communication and collaboration (Brown 2008). In order to solve the complex and uncertain problems in such contexts, design thinking has been shed light as catalyst to make a decisive difference in tough business environment. Various books and articles were written to make business environment adopt design thinking, making it a buzzword (Pink 2006; Martin 2007; Gladwell 2008; Brown 2008). This trend gives designers significant meaning because it is not only by the 'push' from design that has occurred during the past decades but also by the 'pull' of business according to their practical and serious needs.

It is necessary to identify whether this movement is actually reflected in business academia where the current or future 'performers' are educated. Prior to this, it is worthy of overviewing the history of educating (or including) design subjects in business schools in order to compare with the current acceptance of design issues whether it has been improved according to the movement of practical area. The focus to explore up-to-date situation is on Executive MBA programs which could be more flexible to reflect practical issues of the field as they are targeting currently-working leaders. Descriptive and comparative research about top-ranked EMBA curricula of three regions such as Asia (including South Korea and China), North America (mostly USA), and Europe was conducted. Compared to these major programs, several cases of not-major but remarkable EMBA curricula that actively integrate design were examined. In addition, non-degree executive educations that involve design issues were investigated to identify some alternative way of design

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integration to business schools. On the basis of these studies, the pattern of relationship that executive education integrates design was defined. This model could be considered to understand the present situation of executive programs in terms of design integration and to ponder how to progress this involvement henceforward.

HISTORY OF EDUCATING DESIGN SUBJECTS IN BUSINESS SCHOOLS

1960s – 1980s

The first survey on this issue was completed by Bruce Archer in 1967, aiming 140 courses from 45 management training centres in the UK. Actually, only 7 out of 140 referred to design in any significant degree. Moreover, many schools expressed doubts about design as an appropriate subject for management teaching, and there was still great misunderstanding about designers as aestheticians controlled by business strategy. Afterward, however, continuous movements had occurred pursuing design awareness in management in the UK. Since the mid '70s, Bruce Archer emphasized design management for innovation in his lectures at RCA. Concurrently, Peter Gorb delivered a design management course at the post-graduate level at London Business School (Chung 1999). These academic movements subsequently promoted the governmental initiatives, the Design Management Development Project by CNAA, DTI and Design Council[*] originated in 1980. It resulted in an outline curriculum for managing design in the famous report 'Managing Design' in 1984, and they funded six educational institutions for development of further curriculum and their implementation (Cooper 1993). In 1974 in the US, meanwhile, Walter Hoving, then chairman of Tiffany & Co., co-organized lectures with Wharton School of Business at the University of Pennsylvania, the well-known Tiffany-Wharton Lecture Series, to promote his vision of design excellence to business leaders (Formosa and Kroeter 2002).

1990s – 2000s

In 1992 in the US, Richard Blackburn executed a survey to the academic members of AACSB[†] to understand whether to have courses in corporate design. The result was not so different from that of Archer: only 3~4% had courses with actual design-related contents. American business schools also neglected the potential power of design. Ten years later, in 2002, there were three surveys again about design issues, two in the US and one in the UK. At this time, there had been abundant anecdotes of success by strategic design[‡]. Accordingly, the necessity to investigate empirical evidence was augmented. In the US, Thomas Lockwood interviewed 15 of the top 30 US business schools, and Formosa and Kroeter surveyed 19 MBA programs from top 10 schools[§]. However, their results were not bright: design principles were not included in business education yet. Academic resistance was too strong to accept real-world importance partially due to accreditation by AACSB[**] or old business school ranking system of media. In the same year in the UK, Hollins demonstrated that the number of design management courses was declining due to the lack of qualified instructors and accreditation issue by AMBA[††] despite the former academic and governmental movements.

Nevertheless, what gave us a slight opportunity of further upbuilding in their surveys was that several courses referred to design within the context of new product development process. Moreover, some of them provided the opportunity to collaborate on a project with graduate students of design or engineering. In those articles, the authors assumed it would be a bare chance for design discipline to become a core requirement of MBA program. Conversely, however,

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[*] *A joint project by Council for National Academic Awards (CNAA), the Department of Trade and Industry (DTI), and the Design Council*
[†] *Among 644 members of American Assembly of Collegiate School of Business, usable answers returned from 162 schools.*
[‡] *Apple, Chrysler, Target design, Tiffany, General Motors, Starbucks, OXO, FedEx, etc. (Lockwood 2002; Formosa and Kroeter 2002)*
[§] *Top 10 schools ranking in 2000-02 by the Wall Street Journal, Business Week, and US News & World Reports*
[**] *The Association to Advance Collegiate School of Business (AACSB). The curriculum standards for business programs are set primarily by AACSB, and the requirements do not include any design related issue. Business programs are evaluated according to their adherence to these requirements (Lockwood 2002).*
[††] *Association of MBA (AMBA) restricts its accreditation to meet specific requirements, which do not include design management (Hollins 2002)*

they claimed it would be relatively easy to integrate design into elective or supplementary courses, or into corporate and executive education programs which can develop quickly and track more closely with current business practice.

2010s AND BEYOND

Currently in 2012, after ten years again, business world has strongly noticed the strategic power of design. As mentioned in the beginning, they embrace design thinking in their territory to cope with complex and uncertain market dynamics. To foster design integration in business world, the involvement of design in business academia needs to be preceded because here is the place where the real performers are educated. Even though the reality is reversed in that the recognition of design's strategic power in business world has been commenced from the practitioners, the effort of involving the actual needs to academia is necessary for continuous co-prosperity of both worlds. Hence, now is the appropriate time to update business schools' reactions reflecting this fast-moving reality and to identify the improvement from the past situation.

CURRENT SITUATION

PRESENT STATE OF MAJOR EXECUTIVE MBA PROGRAMS: STILL HIGH ENTRY BARRIERS

Considering the previous survey results in 2002 (Blackburn; Formosa and Kroeter), it would be better to focus on Executive MBA programs. These programs aim the executives or upper level managers in companies, who can exert strong influence to one's organization. These persons are strongly associated with their professions or businesses; eager to apprehend the market reality and to adopt themselves accordingly. Moreover, given the importance of leadership in design management, executives have more potential to implement design management with vigorous drive. So, Executive MBA (in short, EMBA) programs are more applicable to reflect these kinds of practical needs and respond to the real world changes.

In order to conduct descriptive and comparative research, the top seven EMBA programs in each region of Asia (including South Korea and China), North America (mostly from the USA), and Europe (the UK, France, Spain, Switzerland, Germany) were selected referring to various rankings from the media[*]. Curriculum structure from each EMBA program were examined to identify whether they have included the following issues according to their course title and the introductory description of the course[†] : 1) Innovation, 2) Creativity, 3) New Product Development, 4) Design, 5) Design Thinking, 6) Design Management. In addition, the type of courses incorporating the issues above was also classified: whether it is a core, an elective course, a module of a course, or a supplementary workshop or mini-course[‡].

The result did not bear out the researchers' expectations about the movement of business academia. The entry barrier of top-ranked business schools was so solid to retain their prominent standard *(see Table 1)*. The issues directly related to design such as Design[§], Design thinking or

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[*] *Top 7 Executive MBA programs in each region were selected referring to the ranking during 2010-11 from Wall Street Journal, Business Week, Financial Times, Poets and Quants, and Whitefield Consulting Worldwide. In case of Asia, 4 schools of South Korea (domestic Top 4 universities' EMBA programs) and 3 schools of China (ranks referred to Forbes China 2010 and Financial Times 2011) were selected. The selected EMBA programs of each region for the survey were as follows:*

1)Asia: KAIST; Seoul National Univ.; Yonsei Univ.; Korea Univ. (4 schools from South Korea)
Cheung Kong Graduate School of Business (CKGSB); China Europe International Business School (CEIBS); Hong Kong University of Science and Technology (HKUST) Kellogg-HKUST EMBA (3 schools from China)

2)North America (USA): Chicago Univ.-Booth; Columbia Univ.; Northwestern Univ.- Kellogg; UCLA- Anderson; Michigan Univ.- Ross; Pennsylvania Univ.-Wharton; New York Univ.-Stern

3)Europe: IE Business School (Spain); INSEAD (France); London Business School (UK); IESE Business School (Spain); HEC (France); IMD (Swiss); ESSEC-Mannheim (France/Germany)

[†] *Usually, the counting was according to the title of the course. Even though the course's title does not include the corresponding issues above, it was counted when the course's contents focus on that issue if the syllabus was available. However, the availability of the syllabus was very low.*

[‡] *The examination about the curriculum structure, description of course, and course types was conducted based on the information from the web pages and the e-brochures of each school. It could be possible that some of the elective courses, modules, or supplementary workshops might not be counted here because the webpages or e-brochures sometime do not describe all the details of this level. Even though the detail information about the courses or contents was asked to the faculty of each school, it could not be gathered enough to investigate more in-depth.*

[§] *The courses such as 'Organizational design' were not counted as they are evidently irrelevant to 'Design' issues even though including the word itself.*

Design Management were scarcely involved in the curricula- only 2 elective courses were identified: ‘Specific topic in EMBA: Design Management’ in KAIST EMBA program in South Korea; ‘Usability in Design’ in the Digital Design Module of EMBA+ program in IE Business School in Spain. Nevertheless, Innovation was quite highly-covered subject reflecting its significance frequently found as the elective (10 schools among 21) or as the core (6 schools among 21). Creativity and New Product Development were also often handled in the second place both as the elective courses (3 schools among 21 for both subjects). When comparing by regions, Innovation or Creativity issues were relatively more included in European EMBA programs than other regions. Asian EMBA programs also highly covered Innovation issues followed by Europe. As for North America (all from USA), on the other hand, their interests were comparatively more focused on New Product Development than other issues. Among three regions, European EMBA curricula tended to provide more flexible program structure such as transversal modules or diverse concentration themes, as well as the Innovation or Creativity issues in their courses.

It is evident that design-relevant issues are scarcely accepted in the top-ranked major EMBA programs. The entry barrier is still too high for design –even in the 2010s- to be integrated in their curricula because the major academia’s intention to retain their high standard seems strong as ever. Nevertheless, what have been relatively well-included issues such as Innovation, Creativity, and New Product Development could show an opportunity for acceptance of design. These three subjects were usually included in the courses from strategy and management, marketing, or entrepreneurship department. These courses are more flexible to include practical contents compared to those more focused to fundamental theories such as accounting, economics, finance, or statistics. When the design issues such as design thinking or approaches become more widespread as the way of innovation, creativity, and new product development, these courses can be appropriate access point to connect design issues to business curricula.

This was the situation of top-ranked major EMBA programs whose rigid standard is too strong for design issues to be integrated into their education. However, it was possible to find several EMBA programs which are very active in incorporating design subjects in their curricula because they are relatively flexible from rigid standard that top-ranked programs have. These cases will be introduced in the next part: three from Asia; one from North America.

Table 7 Inclusion of design-relevant topics in top 7 EMBA programs’ curricula of each region

		Asia	North America	Europe	Total
		(n=7)	(n=7)	(n=7)	(n=21)
Innovation	Core	2	-	4	6
	Elective	4	3	3	10
	Module of a course	1	-	2	3
	Supplementary workshop/ Mini-course	1	-	1	2
Creativity	Core	-	-	-	-
	Elective	1	1	1	3
	Module of a course	-	-	1	1
	Supplementary workshop/ Mini-course	-	-	1	1
New Product Development	Core	-	-	1	1
	Elective	-	3	-	3
	Module of a course	1	-	-	1
	Supplementary workshop/ Mini-course	-	-	-	-
Design	Core	-	-	-	-
	Elective	-	-	1	1
	Module of a course	-	-	-	-
	Supplementary workshop/ Mini-course	-	-	-	-
Design Thinking	Core	-	-	-	-
	Elective	-	-	-	-
	Module of a course	-	-	-	-

	Supplementary workshop/ Mini-course	-	-	-	-
Design Management	Core	-	-	-	-
	Elective	1	-	-	1
	Module of a course	-	-	-	-
	Supplementary workshop/ Mini-course	-	-	-	-

REMARKABLE EMBA PROGRAMS: ACTIVE INTEGRATION OF DESIGN ISSUES

Four significant EMBA programs (or MBA for general managers) which actively integrates design issues are as follows: aSSIST iMBA in Seoul, South Korea; Polytechnic University MBA in Hong Kong; Welingkar Education Executive PGDM in Mumbai, India; Rotman School of Management EMBA in Toronto, Canada.

aSSIST

The First case is 'aSSIST' (Seoul School of Integrated Science and Technology) in South Korea. aSSIST is a graduate school of management quite recently established in 2004, and iMBA[*] is a double degree executive program of aSSIST and Aalto University School of Economics. Their curriculum is composed of the core courses about business foundation; the elective courses for concentration modules; the other elective courses for general modules. Especially among thirty concentration modules, they provide five modules which are dedicated to design subject (the portion is around 17% of all concentration modules). Detail modules are as follows:

- **Design Management**: To understand on the nature of design economy, the concept of design promotion, and its application to the business
- **Design for Brand Recognition Strategy**: To understand the concepts, perspectives, and approaches of analysing the relationship between brands and product design
- **Digital Innovation and Design Thinking**: To think how companies can organize themselves to continue to innovate with three key words of customer experiences, digital technology, and design
- **International Design Business Management**: How to develop and manage design business covering the issues such as (1) Managing the Design Business; (2) Design management and organizational design; (3) Strategic and operative benefits of an integrated platform approach to design
- **Service Design**: To understand services business-wise as well as from the perspective of developing and designing services inspired by users

aSSIST iMBA's particular courses on design issues are mainly focused on design management and design strategy in real business circumstance: the development and management of design resource in corporate environment; the relationship between brands and design for effective brand strategy; the managerial, operational, and organizational perspective on design business; recently emerging area of service design from the viewpoint of business. Though aSSIST is a specialized graduate school of management, it is relatively recently- established academy and their curriculum could be developed and evolved highly considering design management issues from the beginning. Furthermore, thanks to the partnership with Aalto University, where the School of Economics, Technology, and Art and Design are integrated together, aSSIST could have more advantage to elaborate the program in tandem with Aalto's multidisciplinary curriculum. In other words, for a recently-developed or institute-level (not a collegiate university) academy, the

[*] *This program was previously KEMBA (Korean Executive MBA) provided by the Institute of Industrial Policy Studies (IPS) associated with Helsinki School of Economics (HSE) since 1995. Since then, this curriculum was transferred to newly established aSSIST in 2004 with the title of aSSIST-HSE EMBA. In 2010, as HSE was integrated to Aalto University, this program has been reorganized as iMBA, a double degree program with either Aalto University School of Economics or State University of New York at Stony Brook. The former with Aalto University is a standard MBA program, and the latter with Stony Brook University is more specialized to Technology Management curriculum.*

partnership with well-established program in design integration would be an effective approach to involve design issues more comfortably.

HONG KONG POLYU

The second case represents Hong Kong Polytechnic University (PolyU)'s MBA[*] program also well integrating design subject. Different from the previous case of aSSIST, PolyU is a collegiate university, thus it includes School of Design as one of the departments as many other universities do. What is notable is that they highly invite their design school's intelligence into the MBA curriculum. Among their 23 elective courses, 6 are the courses delivered from School of Design (around 26% of all elective courses):

- **Consumer as Producer**: Critical Trends in Product Development and Consumer Culture: To understand the new critical aspects of product development and consumer behaviour
- **Globalization and Design**: To understand global characteristics, especially the network society, and to explore their consequences for today's design production
- **Strategies for Sustainable Product-Service System**: To acquire ways of thinking for generating sustainable design solutions and strategic level ability for creating sustainable value
- **Strategic Design**: Regional Case Studies: To understand the importance of strategic design approach as a sustainable way to stay in a competitive market with the cases in Mainland China and the South East Asia
- **Innovation Products and Services Development**: To develop disciplined and systematic approach to the process of identifying, conceptualizing and realizing an innovative new product or service
- **Innovation Tools for Strategic Design**: To provide an overview of various tools that help strategic designers go through the innovation process

The design-relevant courses of PolyU MBA include more the design issues of product/service development compared to the courses of aSSIST, but it covers relatively full spectrum: not only the global and conceptual perspectives of design in business such as the relationship between the network society and design production, design strategies for sustainable values; but also the practical perspective of design application. For instance, 'Innovation tools for Strategic Design' course introduces four stages of product/service design development process, then concrete tools of each stage in the process are introduced with demonstration, case illustration, and practice application[†]. Usually, they are delivered in the format of case studies, seminar with design professionals, workshop in team project, practice and tutorials which are effective ways of 'learning by experience' to understand and acquire design characteristics. This kind of integration at the level of concrete practice of design process could be feasible as PolyU has its own design school in the same boundary. To share the workshop studio or facilities of its design school as well as to invite internal design faculty is a considerable advantage for this MBA program. Besides, some courses such as 'Innovation Products and Services Development' are delivered by multidisciplinary team from School of Design, Business and Engineering faculties to maximize the synergy. This kind of interdisciplinary collaboration at the level of faculty, also probably at the level of students, is another benefit of involving in-campus design partner. In short, PolyU MBA program can take proactive stance to invite design issues from their own design school's curriculum and they can make full advantage of in-campus design intelligence.

WE SCHOOL

The third case, and the last among Asian cases, is Welingkar Education, so called We School in India. What differentiates We School from previous cases of aSSIST or Hong Kong PoluyU is that

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[*] *Even though PolyU's MBA is not titled as Executive MBA, they demand a minimum six years of work experience in a managerial or professional capacity as their entrance requirements; PolyU MBA program targets at least the level of general manager.*

[†] *According to the four stages of (1) Research/ Discovery; (2) Analysis/ Exploration/ Experimentation; (3) Focus/ Selection/ Synthesis; (4) Implementation/ Collaboration, specific design tools are trained from ethnographic methods, observational researches, or cultural probes; to scenarios, personas, prototyping, etc.*

they elaborated management programs on the basis of design philosophy. In order to create new environment where 'design thinking' is integrated to business management, We School launched the first management program putting design thinking and innovation at its core in 2006. This program was called Post Graduate Diploma in Management (PGDM)[*]-Business Design.

> *To weave design thinking into mainstream management it is necessary to have a multidisciplinary approach to management education. … The programme is designed to keep human beings and their psychological, social and societal needs in the centre, using the 'design-thinking' approach to identify their unarticulated needs and generate plausible ideas for solutions. (Agarwal, et al., 2011)*

The PGDM-Business Design is 2 year Full-time program of 6 trimesters, and the themes of each trimester are as follows: (1) Need identification, Opportunity spotting & Understanding the environment; (2) Concept generation and Business case creation; (3) Business design; (4) Roll-out; (5) Strategy; (6) Academic research project. Under the theme of each trimester, their program significantly reflects innovative and integrative approaches related to design from the early part of the program in the core courses as follows:

- Thinking tools for Innovators (trimester 1)
- Interaction Design Process (trimester 1)
- Triggers for Innovation & Sector Analysis (trimester 2)
- How Business Work - Integrated Project (trimester 2)
- Strategic Innovation Management (trimester 5)
- Promotional Design (trimester 5)

In the first and second trimesters, design thinking/ innovation tools and processes are educated; integrated project-based learning is used to train a holistic view of business; innovation management and design issues are involved again in the fifth trimester of Strategy. It is also the case for Executive PGDM of 15 months' full time program. In the first term, they deliver a course of 'Introduction to Design Thinking (includes creativity tools)' as the core class. It is noteworthy that includes design-relevant courses in the core, not in the elective curriculum. This was possible only after they have elaborated the curriculum starting from the design thinking put as the backbone of their educational philosophy. Furthermore, We School has founded a center for innovation, named 'InnoWe'. InnoWe takes a role of ideal place for cultivating design thinking and encourages the formation of companies in campus from students' innovative ideas; it also conducts research and consultancy for corporations in India seeking for innovation. InnoWe functions as an in-campus hub for infusion of design thinking and multidisciplinary approach; at the same time, more focused to provide prototype lab with guide and mentor for students to transform one's innovative ideas to business plan[†]. To summarize, the essence of We School comes from the core value of design thinking, thus it could underlie as the fundamental of recently elaborated PGDM program and could be well integrated across the curriculum.

ROTMAN SCHOOL

The forth case is from North America, Rotman School of Management already well-known for proactive integration of design issues led by the Dean, Roger Martin. Earlier than previous We School, Rotman School has incorporated an innovative approach to business education with the launch of the Desautels Center for Integrative Thinking in 2002. This center was dedicated to conduct research on the innovative ways of business education and to push the boundary of

[*] *PGDM could be comparable with MBA programs of other business schools in that they are graduate school level education of management. Actually, PGDM is specified by specialization such as PGDM e-Biz, PGDM-Health Care Management, PGDM-Business Design, etc.*

[†] *InnoWe provides i2e (idea to execution) challenge, a contest-like format, to help students to incubate one's creative ideas and scale-up them to business.*

Integrative Thinking. Integrative Thinking is parallel to design thinking in terms of holistic, creative, and interdisciplinary approach. From the Desautels Centre, 'Integrative Thinkers' were defined as follows:

> *Integrative thinkers build models rather than choose between models. They consider the problem as a whole rather than breaking it down and farming out the parts. Finally, they resolve problems with creativity. They produce new, more powerful models rather than defaulting to a choice between two sub-optimal ones.*

The associate dean of Rotman, Moldoveanu M. explained why Integrative Thinking ought to be ingrained in their school's education as such:

> *Solving real problems requires managers to think across disciplines and domains of knowledge and experience, and across the functional silos that are ingrained into the curricula of most business schools. Integrative ThinkingTM is the School's educational platform for developing trans-disciplinary problem solvers, who will be able to synthesize and engage with different perspectives, theories, models and vantage points in real time, in order to achieve superior solutions to the problems they face.*

According to their strong philosophy, their EMBA curriculum has the 'Foundation of Integrative Thinking' in the first term as the core class, similar with previous We School's case. In addition, between the terms there are four residential modules of one week, and one of them is assigned to 'Integrative Thinking' that intensively trains its process and approach. When they characterize the holistic way of thinking and problem-solving as Integrative Thinking, the application of this principle to business practice is by another principle, 'Business Design'. In 2005, Dean Roger Martin and Heather Fraser co-founded 'Designworks', Rotman School's center for design-based innovation and education. This center is devoted to research, development and education of Business Design methodologies; as well as to commercial practice of consultancy. Here offers specialized programs that merge the practices of business and design according to their Business Design principle by incorporating innovative and holistic way of design experience. Thus, MBA or EMBA students are invited to their various Business Design education programs such as Business Design Practicum of 13 weeks, Business Design Boot camp of one-day workshop, etc. In this way, Rotman School highlights the value of design thinking, as they call 'Integrative Thinking', as the heart of their philosophy. Even though the University of Toronto does not have a design school, Rotman School and especially Designworks themselves function as in-campus design hub to instill design thinking to their students on the basis of two principles, 'Integrative Thinking' and 'Business Design'. As explained for We School's case – Rotman School actually firstly started the innovative movement in the world of business education, Rotman developed the whole curricula putting the Integrative Thinking and design approach as the fundamental value. This enabled each course of curriculum to be well woven in order to ingrain the essential philosophy to the students.

So far, four significant cases of EMBA (or MBA) degree programs were identified which notably included design subject in their curricula. Meanwhile, there exist gradual stages among these four. aSSIST iMBA represents an effective partnership with well-established, but external program, Aalto University. For a newly-developed or institute-level academy, this type of relationship is a stable and efficient way. On the other hand, the second case, Hong Kong PolyU MBA for manager level, explains how they bring the internal partner of their own design school and make full advantage of in-campus design intelligence. As having internal professionals, this kind of association will help to construct deeper involvement and collaboration. Compared to these integration of design from the 'outside' of business entity, however, the establishment of business curriculum based on the design value from the beginning as the cases of Rotman School or We School can achieve comprehensive and deep-rooted absorption of design across the curricula.

EXECUTIVE EDUCATION: MULTILATERAL COLLABORATION

The examples of design integration in executive education can be found not only in degree-programs as seen in previous EMBAs but also in non-degree programs for executives. Lockwood (2002) proposed corporate and executive education as the alternative way of design integration because they are not MBA-accredited, thus they can develop quickly and track more closely with current business practice. Formosa and Kroeter (2002) also suggested a design-oriented preparatory or supplementary workshop which could be combined with credit-bearing electives or concentration courses as alternatives. These ways are quite realistic and feasible options considering the still strong resistance of major business academia. There could be identified several cases of non-degree but intensive executive education programs that infuse strategic power of design: (1) by the partnership with design schools; (2) by inviting external design institute to executive education program; (3) by in-campus design center.

HONG KONG DESIGN CENTRE

As the first case, Hong Kong Design Centre (HKDC) represents a multilateral partnership brining leading design schools. HKDC's Institute of Design Knowledge newly organized InnoDesign Leadership Program (IdLP) from 2012 by the partnership with four design schools: Delft University of Technology (TU Delft); Illinois Institute of Technology (IIT), School of Design; Royal College of Art (RCA), Helen Hamlyn Centre for Design; Hong Kong Polytechnic University (PolyU), School of Design. It is a 20-month-long curriculum of forty modules mainly focused on design thinking, design approaches, design theories and methodologies relevant to emerging market needs. Each module is delivered in one to three full-day and interactive workshop-style class and led by various faculty from the above four design schools. Among 40 modules, over 20 classes are dedicated to the subject directly related to design: such as Design Planning, User-centered Design, Design Management, Brand and Design Strategy, Design for Sustainability, Design for Emotion, Creative Tool Box, Interactive Design, Experience Design, etc. Compared to aSSIST iMBA case which is a business degree program inviting external leading academy of multidisciplinary education, HKDC's IdLP also shows the involvement of external partners; meanwhile it is a non-degree but totally focused to design covering full-scope of design subject provided by non-profit organization for design promotion. It could be a pioneering example for executive education not only at the level of schools but also at the level of promotional institute.

KATZ SCHOOL OF PITTSBURGH UNIVERSITY

The second case as inviting external design institute can be identified in Katz Graduate School of Business in the University of Pittsburgh. Among the executive education, Leadership Development Programs introduce Design Thinking as one of their class. They invite the director of LUMA institute for the intensive workshop. LUMA institute is a design consultancy situated in Pittsburgh; they offer educations about design thinking and human-centered design as well as advisory services relevant to design. In this Design Thinking course, various tools of understanding users are introduced by workshop such as stakeholder mapping, ethnographic research, personas, participatory design, etc. In the similar way, LUMA institute provides Human Centered Design class to MBA students through the Leadership Center of MIT Sloan School of Management. In more casual way, they also provide some advisory session to Harvard Business School students' Design Club. Differentiated from the previous HKDC IdLP, this type of involvement by local external design professionals near the university could be relatively easy and rapidly adaptable way to most of ordinary business schools which do not have their own design school in the university.

STANFORD D.SCHOOL

The last case, Hass Plattner Institute of Design in Stanford University, usually called 'the d.School', is an emblematic in-campus design center. The d.School was launched in 2005 to propagate design thinking and design innovation to their student. Apart from standard degree program in

Product Design*, the d.School offers various classes for the students of non-design background to be inspired by design thinking and innovative approach: such as Transformative Design; d.science: Designing for Science; d.leadership: Advanced Coaching; Creative Gym: A Design Thinking Skills Studio; Launch Pad, etc. 'Design Thinking Boot Camp' is one of these programs for the executive education in Stanford Graduate School of Business. With the title of 'From Insights to Innovation', they offer a three-day workshop within the inspiring atmosphere of the d.School that intensively delivers design thinking; human-centered and prototype-driven approach for innovation. As the d.School is an in-campus design center of Stanford, it is highly accessible for Stanford students of any background to participate in the classes and to learn by experience the innovative way of thinking and process. In this way, it could work as an incubating hub of innovation that infuses design thinking across the university members. Previously mentioned Rotman school's Designworks and We School's InnoWe are also categorized as in-campus design centers that deliver design thinking and innovative approach to all members of the school as well as to those from business schools. This kind of university's internal center could be a sustainable way to disseminate design issues as its target of education is not limited to business schools but to all across the university.

The above three cases represent multilateral collaborations for non-degree executive education on design in different format of partnership: that with external leading design schools; with local design professionals; with the in-campus design center. In common with the EMBA programs introduced as the cases of design integration, the executive education programs also have different advantages according to external or internal partnership. External partnership with leading design schools as the case of HKDC InnoDesign Leadership Program shows the efficient way to connect famous design intelligence; it could be challenging though for ordinary business schools to elaborate fully design-focused program. Another type of external partnership such as Katz School of Pittsburgh University with LUMA institute can bring rapid involvement of local design professionals with higher accessibility than the previous case. On the other hand, internal partnership as the d.School of Stanford University can expect more continuous propagation of design both into the business school and the other members of university. Above all, these non-degree executive educations are more flexible way than standard degree programs. They can be the alternative and initial steps of major business schools to gradually instill the design issues in their boundary.

FINDINGS AND CONCLUSION

THREE MODELS OF DESIGN INTEGRATION IN EXECUTIVE EDUCATION

In synthesis, the four cases of EMBA and three executive education programs show several types of incorporation according to the way in which design issues are integrated into their curricula. If the models of integration are defined, they can be referred for each business school to identify more specific and applicable way according to its current state: how it can improve the design integration from now on. The way of design integration can be conceptualized into three distinct and gradational models as follows: (1) design invitation by out-campus partnership; (2) design integration by in-campus intelligence; (3) hub of design infusion in itself.

* *The programs of Stanford's Product Design major at undergraduate or graduate level are collaboratively offered by Mechanical Engineering and Art Department. As Design Thinking and innovation are the core values of Stanford Design program, all degree programs incorporate them in the curriculum.*

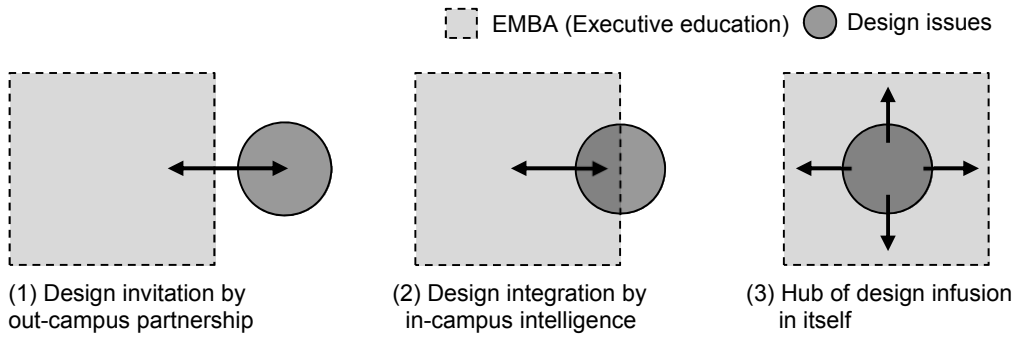

Figure 7 Three models of design integration in executive education

The first type, design invitation by out-campus partnership is relatively easy and rapid way to be adapted to current standard executive education programs when they have no design intelligence in-campus. Executive education program of Katz business school in Pittsburgh University with LUMA institute represents the successive cases of inviting out-campus partner to involve design professionals in their program. InnoDesign Leadership Program by Hong Kong Design Centre with four world-leading design schools, though HKDC is not a business school but a dedicated center for design, is also the case well-showing multilateral partnership for executive education. The major EMBA programs have revealed in the survey the difficulty to accept design issues in order to retain strong standard of their curriculum. Therefore, this type of approach- in the format of non-curricular, supplementary classes or workshops inviting external design experts - would be more realistic to them without significant alteration of original curriculum.

The second type, design integration by in-campus intelligence, is more effective and sustainable way compared to the first type if the school has internal design department or organization. The case of Hong Kong PolyU's MBA program highly integrating their design school's curriculum; Design Thinking Boot Camp as executive education of Stanford business school by the support of their famous 'd.School' demonstrate the effectiveness of this type. aSSIST-Aalto iMBA program can be the intermediate example of the first and the second type as they have the partnership with Aalto University and also have own design-relevant module among the curriculum. When involving in-campus design intelligence, it is more viable to share the school's common philosophy; more convenient to communicate among faculties; more efficient to arrange multidisciplinary collaboration across the department. Even though many of business schools have own design department under the same roof of university, it is not the often case to actively integrate them. There might exists a powerful opportunity to join hands at the very near side.

The third, the last and most influential model is that the executive education program, more broadly, the business school itself becomes a hub of design infusion. It might be the most challenging and far-away story, but we have two emblematic real cases: Rotman School of Management in Toronto and We School in Mumbai. These schools have established putting design thinking and innovation as the core value from the beginning; the degree/ non-degree programs and their curricula have been elaborated bearing this value on the basis. Even these schools infuse design thinking and innovative attitude not only to their students and faculty but also to the outer world such as other universities, various academia, lots of practitioners of industry, etc. Rotman's Designworks and We School's InnoWe also take important roles of infusion through education or cooperation with external partners. Indeed, these two schools are working as 'Hubs' in themselves. As mentioned, this type is the most difficult and challenging model, nevertheless the sustainable ripple effect would be extensive toward various area.

The significant factor is that these models of design integration cannot be developed only by business schools. Even though design thinking became a buzz word in business area and there arose some initial movements of 'management-pull' as identified in several EMBA programs and executive education courses, without active involvement from design area it might stay as a trend

of business world. It is the very moment that design academia could respond to and proactively interact with business academia elaborating effective and practical design education programs for gradual integration henceforth.

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FROM THE PERSONAL FACTORY TO SELF-PRODUCTION:REVISING DESIGN RESEARCH AND EDUCATION FOR POST-INDUSTRIAL SOCIETIES

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Along the crisis of industry, knowledge and the creative labour come to be the primary workforce capable of generating value and innovation. Industry is living an historical shift of its role within society and production through the admittance of the new technologies and the service sector.
The process of digitalization is leading to a transformation of the nature of the enterprises, while opening to new forms of micro-factories and “personal capitalism”, in order to share locally and globally skills and knowledge, as well as resources and tools, to the accomplishment of projects and products.
The new generations of designers have come to terms with deindustrialization and, while their predecessors had a role in the assembly line with manufacturing processes, today’s designers are aware of their service and strategic role concerning innovation.
Then, the young designer is experiencing a special space for self-organization, while incorporating all the productive aspects in his own office and even experimenting with self-branding, thereby revealing a spontaneous and alternative space to the official production.
Can we still speak of industrial design, while production seems to assume a completely new shape and organization, while delivering new outcomes? What are the characters of the post-industrial production in order to address design education and the role of the creative practitioner?

Keywords: Post-Industrial Society; Knowledge Economy; Self-Production.

ONCE UPON A TIME

The big crisis of industry is revealed by the productive, organization and technological transition from the large Fordist factory that has characterized the twentieth century, to the new post-Fordist production system, including open source, customization, crowd-sourcing and small batch.

The diagram of the Taylorist assembly line is well represented by the renowned and celebrated image of Charlie Chaplin taken from the movie 'Modern Times'. Here, the actor is portrayed as one of the many metal workers engaged in a sequence of serial movements to comply the rhythm of the production machine. According to the scientific division of labour, men, motion, machines and products are arranged in line, all the same and serial, in order to build the competitive advantage of the factory.

Taylorism is the concept developed by the American engineer Frederick W. Taylor to indicate the maximum business efficiency: every task of the worker is exactly defined in order to remove any dead time in favour of the scientific productivity. As a result, the worker won’t waste any time in front of the machine with any unnecessary action (Taylor, 1911).

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If the concept of Taylorism relies on the scientific organization of the work in the factory, the Fordism becomes its practical application in the big automobile industry. In the organization of his factory, Henry Ford followed the idea of the assembly line, bringing the work to his employees through tracks and belts, thus eliminating any redundant act and saving time and money.

As a direct consequence on everyday life, the reduction of the best shape to the most economical way to meet the satisfaction of a necessity, made possible the development of standardized objects for standardized habitats, which in turn made possible the definition of standardized practices of living. This would be the warranty for the fulfilment of basic needs for a healthy and peaceful human existence, as a repetition of a static reality: a form to be reproduced forever and indefinitely, as the inevitable result of an absolute progress.

Additionally, the hierarchical concept of seriality is extended to the entire society, not only in production, but also in housing and the urban settlements. It is enough just to have a look at the plans of the utopian cities of Ebenezer Howard designed at the very beginning of the 20th century, in order to understand how such categories would find a spatial expression in urban design. Each element has its place in an organizational hierarchy that leaves no room for downtime (Howard, 1902).

A bird's-eye view of what is left of Detroit today, once a flourishing capital of the automotive industry and home of the Ford company, displays how that utopian plan has actually been realized in the perfect grid of its streets and in the social division of the districts. The parable of Detroit is the physical metaphor of the crisis of Fordism: the decline of the automotive industry and its production has given way over time to the decline of the city to industrial archaeology (see: http://www.time.com/time/photogallery/0,29307,1864272,00.html).

The crisis of the factory is also the crisis of the city, and moreover the crisis of an organizational and productive system.

AUTOMAKERS AFTER DETROIT

The automobile industry has always been considered the most important for sales, which had to be followed for understanding the organizational models of production. It is therefore useful to examine its changes over time to perceive the shift in the direction of the post-industrial and knowledge economy.

AMG is a company related with Mercedes Benz, which offers high-end sport cars derived from the famous car manufacturer, but highly customized and exclusives both for engine, as for shape and accessories, thus providing the sports user a unique and individual experience (http://www.mercedes-amg.com).

The philosophy of production is one-man/one-engine, where a single iper-specialized worker follows a single car through every stage of construction. At the same time, the client has a unique reference person for his car, who is able to define in detail every characteristic of the product. The Fordist-Taylorist scheme is completely reversed: instead of many workers dealing with small and bounded segments of the process of production, without being allowed to see the product in its entirety and complexity, here few technicians take the responsibility for the assembly of each engine, even leaving their signature on it. It is clear the proximity with the artisanal scale, which however is overcome by the presence of a highly technological environment (Sennett, 2008).

Likewise, if the historical Ford factories contained the production of every part that would have manufactured the final car, until the assembly and test drive, at the AMG factory each car is equipped with advanced components taken from different places, through an open-source scheme.

In some respects, the experience of the American Local Motors is closer to the philosophy of the German AMG, but with an indie and Creative Commons bottom-up approach (http://www.localmotors.com). This micro-factory in Massachusetts, is launching the project of a street-legal off-road model car, which is produced with a crowd-source collaboration and will be manufactured and assembled locally by the customers themselves in specialized centers. The

Rally Fighter, as it is called, is the result of a competition for the design of a sort of kit-car, and the co-creation of a community of volunteers, who have designed and edited the parts and the components. The final product does not contain a signature of a single creator, but a collective, among which you may find industrial designers, engineers, fabricators and 3D CAD modelers. Even more interesting, each project is manufacturable in a different place and customizable by each client, who may make additions and implement the original project.

The occurrence of the micro-factories calls into question some of the categories on which the Fordist capitalism was founded and grew up, through the Trans-Nationalization of the industrial processes and the fragmentation of all the integrated upstream and downstream activities, from design to distribution.

SMALL BATCHES

Recognizing that nowadays we live in a condition of "finite market", which is to cohabit with a slow or even no growth, forces to radically rethink the production strategies in the direction of the needs of the market, which should be considered such as a fluctuating and unstable variable and then subject to sudden alterations (Coriat, 1979). On the opposite side, the philosophy of the Fordist model was measured on its unlimited capacity and extension of growth. The mass production and the economy of scale needed a continuous and exponential expansion of the volumes of manufacturing, in order to reach stably every segment of the market through standardized artifacts.

The crisis resulted from the saturation of the demand and the economic instability of the production model, fostered the awareness of the limit inherent within each market and the constraints for an unlimited quantitative growth of the volumes of goods. The revision of the Fordist-Taylorist system to "*penser à l'envers*", which is thinking an inversion beside the massification and standardization, in order to offer customization and small series in a wider geographic scenario, opened to new forms of lean production, which Toyota has been one of the main historical reference. "This is a situation which is exactly the reverse of the Fordist one: there we had a market which was geographically limited (de-limited) and commercially endless, here we have a market which is geographically global (un-limited: without boundaries), but commercially saturable in the medium-short time." (Coriat, 1991)

The development of the micro-factories seems quite close to the phenomena of ‘personal capitalism’ that Bonomi and Rullani observe through the transformation of the nature of labour and enterprises in Italy. Here, the Italian authors study how the small enterprises have the ability to compete on the market for their extraordinary capability to organize the advantages of the division of labour and the sharing of skills, thanks to their people-to-people relations and the social capital, which is settled in place (Bonomi, Rullani, 2005). The personal capitalism is based mainly on the people and their ability to enterprise, while sharing knowledge and projects, also taking the risks and investing personal resources.

If the big Fordist corporation was self-sufficient with a heavy pyramidal structure of organization, the model highlighted by the Italian industrial districts is made of a number of flexible little and medium enterprises, networking each other horizontally and geographically positioned. The emergence of a new form of “personal capitalism” is about people organizing autonomously in smaller entrepreneurships, while sharing locally and globally skills and knowledge, as well as resources and tools, to the accomplishment of projects and products. It is not anymore the big Fordist industry hierarchically concentrating all the resources, the production and the products in one place, but a number of small and medium enterprises located in different places collaborating together and taking advantage of each other’s expertise and specialization.

PERSONAL FACTORY

Along with the micro-factory approach, the development of rapid prototyping, namely 3D printing, laser-cutting and CNC technologies, opened to a new wave of tools and services helping

the designers to be entrepreneurs of their projects, without the need of investing to cover every stage of production/distribution/selling. Ponoko and Shapeways were born to help industrial designers to physically prototype and make their projects, also choosing the material, and then have it shipped home (http://www.ponoko.com; http://www.shapeways.com). Designer has only to upload the digital drawing, also taking advantage of a number of tutorials they may find online, thus making both design and production more accessible, personal and democratic.

Apparently, the process seems just an online version of the service shops where designers used to go to have their work printed out, but furthermore Ponoko and Shapeways operate as platforms connecting together designers, DIYers and buyers, creators, digital fabricators and of course material suppliers, then becoming a real personal factory and a marketplace at the same time. In fact, designers can upload their projects and, after setting the copyright licence and pricing, display their products or plans in a sort of showroom and also share it through social networks. Here, the buyer may be just the final customer who is able to purchase the final physical product and have it delivered directly at home. Or alternatively, this may be a maker, who will be able to download and produce the project at the price of the copyright licence.

Such experiences display the new configurations that the organization of production may assume through manufacturing on demand, and the role design can play. Here, it is not the product to be innovative itself, but the way this is developed and the number of peers it involves.

The decline of the big multinational manufacturing companies is opening new spaces for such ‘personal capitalists’, which are able to self-organize as individuals, with their unique trait. Knowledge and creativity rise to be strategic levers to the new technologies, in order to create innovation and value and to develop new autonomous experiences of production.

HACKING THE PROFESSION

Individual capitalism and personal factory seem to be some of the results related with the democratization of the production technologies and the design tools. Also, the designer seems involved in the management of the process and the organization of production, rather than just in the design of the products. As a result, the shift is involving also a change in the role and even the status of the designer in contemporary society: if his digital tools are easier and more affordable than ever, design ceases to be an elitist profession, while it becomes a ‘mass profession’ (Imbesi, 2007).

As Richard Florida testifies along the rise of the creative class, the number of the knowledge-based professionals doing creative work has increased vastly over the past century (Florida, 2003). Therefore, still project plays a role in serving a broad demand of products, experiences and services for economy and society, but the designer resigned the role of the positive hero creating unique shapes for the salvation of society. He is not anymore standing in the middle of his office as the supreme professional creator of radical utopian worlds, rather he is networking with a number of different peers, while taking advantage of every chance is coming from the new media, and finally drawing what in a few years can be a real industrial model to follow. The designer is pretty much embedded in a real world, while accepting to play a role in its organization.

Furthermore, through the development of new technologies, the fine line dividing the professionals and the DIY is shading, while letting a number of people approach the field in an unconventional and hacker way. Since 2005, the magazine MAKE started to gather and publish projects that people developed in their garage, giving them the dignity of the professional work and raising the bar, while sharing knowledge (http://makezine.com). The readers of MAKE are also the designers who submit their projects to the magazine, while developing a worldwide community. They all are real projects, with the related prototypes, applied technology and specifications, but their creators/inventors are not skilled designers, nor engineers coming from an academic environment. They are just people whose power is sharing together experiences and knowledge

and a clear proof of the fact that the activity of design has a wider audience out of the traditional professional boundaries.

Another related experience can be found with Instructables: this is a web-based documentation platform where passionate people share what they do and how they do it, while learning and collaborate with others (http://www.instructables.com). Even more interesting may be how Instructables incubated, developing a short circuit between academia and geek culture, tinkerers and amateurs. In fact, its founders can be reached from the MIT Media Lab, who afterwards started the Squid Labs, and now Instructables gathers musicians, artists, designers, software developers and so on, all together with the objective of building a place to share projects and help for more.

THE DIY REVOLUTION

The computer with its capabilities has become the ultimate tool to manage every stage of production, from design, to manufacturing, to communication, distribution and sale. Also, the accessibility of the digital media brings back again the worker and the product closer together, as it was before the industrial revolution, while opening up to new design experiences and economies. The designer is then able to become a self-entrepreneur while managing a form of micro-factory, while building new biographical and above all productive scenarios, while developing new critical keys beyond immediate marketability. If we add information technologies and the advance of rapid prototyping and its relative accessibility, for the first time the designer finds himself in the unique position to close all the production circle by himself, while autonomously managing everything from design, to production, to distribution, all the way to communication and sales.

The young designer has now learned to take advantage of his ability to autonomously and collaboratively connect to the net with his peers, so independently incorporating all the productive aspects in his own office and using his name as a real brand. This can be recognized as a radical anthropological change of the profile of young designer, or of any ‘creative person’: the design office becomes a design management office, the prototyping lab becomes a small factory producing small runs, and internet portals and e-commerce take over the responsibilities of the distribution agent. Furthermore, he can handle all the aspects related to communication, by designing the packaging and devising the corporate identity, until covering all the strategic aspects for product marketing, by setting up of sales points and even doing the selling.

The post-industrial shift forces every young designer to understand and be connected with the proliferating global design network, so that he is able to re-think his role and work, while moving in the direction of the new scenarios for design. This should be considered as a spontaneous and alternative space for design, disclosed alongside and often overlapping official production, which may expand design power and trace a new line for innovation.

COLLECTIVE INTELLIGENCE

According to the wide maker movement, a number of platforms are offering parts, tools and equipment, in order to make any complex project possible, whether this is an electronic gadget, an artwork or a robot. In particular, Adafruit Industries and Sparkfun electronics provide products and resources designed to make the world of electronics more accessible to the average person (http://adafruit.com; http://www.sparkfun.com). According to the open-source philosophy, not only making but also learning is in their mission: as a result, tutorials are offered to help educate individuals to play in the world of embedded electronics.

The designer seems to be never alone in his individual efforts, rather he finds himself to be part of a larger network along the organization of his work and taking advantage of a wider collective intelligence with the related cultural interactions. Pierre Lévy stands that there is an intelligence disseminated where people are and the ultimate goal of technology is broadcasting and connecting knowledge in order to share, valorise and collaborate globally (Lévy, 1999). As a result, each project that seems to be created from nothing, it is always the result of an open network of

references that makes it a cultural product. Namely, it should be considered the product of a collective heritage, which has been somehow involved both in its physical and cultural construction, while integrating earlier creations as well as future perspectives, through practices of interpretation and processes of negotiation.

Collective intelligence is practiced not only online through digital platforms, but also through shared workshops, where to find and learn how to use sophisticated prototyping tools and equipment for supporting complex projects. This is the case of TechShop, which helps people making their ideas with tools, space or skills (http://www.techshop.ws). TechShop can be explained as a new form of entrepreneurship that applies the concept of collective intelligence in a shared space, like a fitness club, but providing a wide variety of fabrication machinery and tools which a single may not access, or even specific courses empowering those who need to get up to speed. Very far from the big space of the old factory, Techshop looks more like a hackerspace, where people share common platforms and knowledge.

Entrepreneurship means also taking a risk and investing resources: sharing tools and knowledge is not always enough as every project needs the right volume of funding at the right time. Kickstarter is born as a platform to showcase creative projects and connect their authors with a wider audience that can be interested in supporting (http://www.kickstarter.com). This can be considered as a new form of commerce and patronage, resulting from the phenomena of crowdfunding, which is a way to activate people and resources in a bottom-up way. If people collaborate together for sustaining a project, the end result is not anymore just the product of a single person who generated the idea, but can be considered as a shared collective product. This is more or less like any company developing manufactured goods, where the end result is branded by a group, which is also a collective; but in the case of the kickstarter, the projects funded can be shared with the entire society, which can be promoter and sponsor.

A NEW PROLETARIAT CLASS GROWING

If the physical ‘objects’ are in the background of the creative activity of the project, design itself becomes a service in a collaborative network of players, where every segment is helping to finalise the end result. As property and goods were at the heart of the industrial capitalism and could be used for measuring the degree of innovation of production, the post-industrial era is investing in the immaterial assets of knowledge. The labour of the mind comes to be considered the primary workforce for generating value and design is an activity that can be located in-between ‘doing’ and ‘knowing’, material and immaterial.

In the knowledge society, the digitalisation process permeates every trait of the professional activity; it determines times and resources, and thereby reduces the entire design process to producing and processing data that has been re-elaborated by the knowledge and creativity that are put into play. As said, the computer becomes the ultimate tool (Gorz, 2003), and unlike instruments requiring innate specialised skills and abilities (like the ability to draw by hand), today’s user-friendly software opens up the field to a vast, totally new group of young people, who would not have had access to design earlier.

In this way, the rate at which software is updated measures how quickly innovations are made to products, and design training becomes continuing education and learning how to use updated technologies, thereby constantly redefining the rules of the game. In order to increase the value of their own cognitive ‘fixed assets’, as André Gorz would call them, creative people need to continually update and reinvest their knowledge through a constant training, in their daily grind producing and managing themselves and their ideas, knowledge and techniques (Gorz, 2003). Even when off the job, they form and transform their knowledge and abilities: as a consequence, the continuous mobilisation of this live workforce through a constant creative effort occupies every moment of their daytime, shading the border between the time devoted to work and the time for leisure.

Everything in designers' daily lives - relationships, affective and emotional aspects, language and the ability to co-operate - is used as an investment to produce value. Thus, the anthropology of young designers is creating a 'creative proletariat' class, or to use a neologism, a 'creative *cognitariat*' (namely a cognitive proletariat of creativity) primarily through the imposition of new technologies (Imbesi, 2008).

In satisfying a broad demand of aesthetics, the 'creative *cognitariat*' is pushed to reinvent its own role every day, generating new products and services, as well as new markets and consumption models. The emergence of this new character with a bent for mobility and innovation, is spreading in our global cities, a bit as our 19th-century ancestors on the assembly lines created the *cité industrielle*.

Here, we are again in a factory, but this time Charlie Chaplin is networking with his peers.

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DESIGN MANAGEMENT IN IRAN: PROS AND CONS

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Most of the literature on design management is based on research in industrialized countries, but our understanding of the subject in other cultures is quite limited. As such, this paper aims to provide an in-depth understanding of design management in Iran. Besides, by identifying potential links between design and industry, this research aims to widen the horizons of design management in the country. Principal approaches addressed through the research include; (1) reflecting the current status of design management in Iran and (2) drawing some meaningful conclusions for a more fulfilling future. Using the data gathered by five individual interviews and further documents, two scenarios for solving the complex situation are proposed; enhancing the implementation of design management on the cultural pavement and Management of industrial design in education system.

Keywords: Design education; design management; culture

INTRODUCITON

The history of Industrial Design in Iran goes back to 1983, when it was first established in University of Tehran as an academic discipline. During the past decades its potential has increased. Now there are 11 universities which have founded this major, and among them seven centers offer the postgraduate level. According to some economical problems, most of the manufacturing companies need applied design for their products (Larijani, 2010). So relationship between industrial firms and industrial design departments are known as a critical issue. In this regard, a pilot study has been conducted to reveal the different aspects of the issue.

Under this condition, the present research seeks to reflect the diverse view points, evaluating the capacities of the industry and design education to draw the current statues of design management in Iran. These data can help Iranian universities in enhancing the design education by rearrangement of the course works in order to be more compatible with the local industry. Beside the mentioned results, help design managers to understand the national industry far beyond the academic literature. As such, a small pilot study was conducted to prove the validity of research, which reveals the different aspects of the issue. The results were later shaped the main stems of the interviews.

PILOT STUDY

Since the establishment of industrial design in Iran up to the year 2011, more than 2800 students have been graduated. Students normally enrol in a 4-year program and must successfully

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complete a minimum of 138 credits. Professional courses in the mentioned program are Basic Drawing Studio, Fundamental of Industrial Design, Form and Space, Model Making, and 9 specific projects. These projects aim to introduce design students with varied range of divisions such as the process of design, packaging, environmental design and ergonomics. Master degree is based on 32 credits which compared to undergraduate courses are more focused on theoretical aspects. Design management is not included in the curriculum of any levels. There are no specific branches for industrial design major among the universities of Iran; this means there is no fine line between the courses if students are interested in different fields of it. Curriculum is designed to assist students to develop their creative and technological aptitude, and enhance their employability and career prospects.

A variety of career positions are available for industrial designers inside the borders i.e. automotive industry, household appliance manufacturing and defense industry, medical equipment design, packaging design, jewelry design, academic opportunities in universities and running private offices as a freelance, which are more focused on exhibition and interior design. Moreover, exporting foodstuffs offer the opportunity for packaging design. There is also an emerging field of branding which offer a number of positions for a number of design educators.

From the industry point of view, Iran has major industries such as which provide career positions for industrial design educators. On the other hand, the increased rate of imports from China has had negative effects on national economy and GNP. Chinese goods are becoming more popular among the Iranian masses because of the cheaper prices; as a result many of local manufacturing units cease trading (BK, 2011).

The university aspect reveals further points. Industrial design curriculum should be characterized by the constant interaction of theory and practice. But current status of universities' workshops reveals that they are not equipped with tools and equipments which emphasize the practical relationship between industrial design and the manufacturing industry. This insufficiency has a strong negative association at the industry level between graduate students and employment growth. Meanwhile, the quality of theoretical courses is defected by the wrong departments' decisions. To illustrate, among the 5 universities with design departments located in Tehran, the ratio of adjunct professors to associate ones is about 1.3. Regarding to the large number of students, faculty members have to teach the minimum of 12 credit-hours courses per semester, which may be increased up to 18 credit-hours depends on the situation; as the consequence, it decreases the educational quality. Moreover, due to the fact that the syllabus has not yet been revised since the establishment of this major, the drawbacks are undeniable.

From the student aspect, industrial design students are a rapidly growing population; each year about 200 new students are enrolled nationally. In addition, the competitive essence of the entrance exam, selects the most talented and enthusiastic participants. In contrast, there has not been a corresponding growth in career opportunities. Even though it is guaranteed in Iran's Constitution and also there is planning for national sufficiency in production, but establishment of more job opportunities for design educators seems unlikely due to the failure of business community in understanding the essence of design.

METHODOLOGY

The present research is a cross-sectional study, aimed to provide some insights into design management in Iran. By implementing a pilot study, fundamentals of industrial design discipline among universities of Iran got observed. In this phase of data gathering some related factors are conducting i.e. the critical gap between design education and industry and the cultural aspects which lessen the role of design mangers in action.

In order to understand this better, a series of interviews with key individuals working within the design education, along with literature stemming from a variety of disciplines was examined. In

doing so, qualitative research has been conducted for analyzing and interpreting text and interviews in order to discover meaningful patterns to help answer the above mentioned questions.

The interview questions were based on how, what and why questions which are well suited to exploratory investigations in which the phenomenon is not fully understood (Zomerdijk & Voss, 2010). As such, semi-structured in-depth interviews served as the primary source of evidence. Furthermore, questions were asked in an open-ended format and focused mainly on the role of design management, the management of design education, and the relation between design and industry. To increase the validity of the interviews a pilot study was conducted with one participant to ensure that the questions were appropriate in eliciting the insights relevant to the research problem.

In selecting the interviewees, only individuals with established expertise in design management or management of design education were selected, as they were most likely to provide the insights that would lead in fulfilling the aim of this research. Of the list of individuals contacted, five members agreed to participate in the study.

In order to achieve more reliable evidence, a document analysis was also carried out. The units of analysis included cultural and managerial articles, books, websites, third parties and any other relevant material which were indicated by the interviewees. It is important to note, that not all of the individuals proposed additional documents for further studies. Appendix A provides an overview of the chosen individuals and the units of documents that where indicated by each.

The narrative data from the interviews were transcribed and analyzed (Auerbach, & Silverstein, 2003); relevant text is highlighted and grouped into repeating ideas. The repeating ideas got classified into three categories related to the research questions. Similarly the document analysis served as a secondary source of evidence and followed the qualitative media analysis research method.

RESULTS

The five interviews provided a wealth of knowledge related to the current status of design management in Iran from different viewpoints. By analysing the documents, three aspects emerged. The results chapter is dedicated to define these three aspects, using key passages from interviews, as well as key pieces of evidence from the document analysis.

DESIGN

To understand the relationship between industrial firms and design educators, one must understand how language affects culture! In Persian, there is no equivalent word for “Design”. In fact, the same word is being used both for “Drawing” and “Design”; hence, design students in Iran, either by public or business leaders, are most likely to be perceived as painters or illustrators due to the wrong translation. The interviews and subsequent document analysis uncovered numerous instances for the issue since the consequents are not restricted to the verbal culture. To illustrate this point, Iranian government implemented considerable investments with the intention of making the country self-sufficient by 2015 (Saade, 2012). However, it should be considered that its national production without national design. National production is equivalent with copying the foreign products without localization. Consequently, Iran is equipped with fairly sophisticated industry, which lacks in satisfying its very basic local problems.

MANAGEMENT

The other challenge Iran faces in the implementation of design management, roots in Iranian culture. Among the various cultural aspects, the highest standing one is the inappropriate management style which is governed by Ideological and traditional point of view rather than scientific approaches (Bidmeshgipour, 2009). This culture served with management has resulted in keeping back the organizations from absorbing talented workforce pushing them toward development. Consequently, implementing decisions are unbelievably slow (Payne, 2006).

GLOBE (Global Leadership and Organizational Behavior Effectiveness) is a multi-phase method project engaging over 170 social scientists and management scholars from 61 countries in all major regions throughout the world. Expanding on Hostede's (1980) work, GLOBE focused on eight cultural dimensions: uncertainty avoidance, power distance, societal collectivism, in-group collectivism, gender egalitarianism, assertiveness, future orientation, humane orientation, and performance orientation. According to GLOBE dimensions, Iran appeared to have the lowest score on assertiveness among all 61 countries (Dastmalchian, Javidan, & Alam, 2001). It means that, projects will need to be carefully analyzed every step of the way to assure that all the risks have been assessed and understood. Furthermore, Iran's cultural readiness for change is minimal. This means that change is difficult to bring about and is not received with any enthusiasm. The characteristic of traditionally based of Iranian organization has produced more bureaucracy and less flexible toward the environmental changes and as a result less competitive. This hypothesis augment that individualistic cultures are more likely to be economically accomplished (Hofstede, 1980).

Many participants also stated that the family oriented trait of Iranian is another cultural aspect that has infected the managerial style. This refers to the basis of recruiting the employees based on the relations rather than knowledge and experience, since it implies that employing people one knows and trusts is of primary importance.

There are numerous cases to illustrate the incapability of Iranian managerial system. Cases in point, Iran ranked 68th in tourism revenues worldwide, while according to UNESCO Iran is rated among the "10 most touristic countries in the world (PayvandNews, 2003). Also it has one of the highest rates of energy wastage (PayvandNews, 2008). Moreover, in spite of high oil prices in recent years, the double-digit unemployment remains problematic. Consequently, Iran is ranked the highest in brain drain. Furthermore, many of the participants mentioned its inevitable outcome which would be the shortage of innovative and noble ideas that assist a country for further developments. Considering the rapidly growing population (more than two-thirds of Iranians are under 30) the infected managerial skills will even double the troubles in near future.

PRODUCTION

During the interviews, several participants indicated the considerable production leap of the country during the past few years. Iran's economy is being classified as semi-developed and is the eighteenth largest economy in the world (World Economic Outlook Database, 2010). Over 40 industries directly involved in the Tehran Stock Exchange, and Iran is among the few countries that have maintained positive GDP growth despite the 2008 global financial crisis.

Iran's major manufactures include automobiles, home and electric appliances, and industrial machinery. Besides, it has gradually become the largest operational base of industrial robots in West Asia. Iran ranked the world's 12th biggest automaker in 2010 and has a fleet of 11.5 million cars. Although the majority of government revenue is based on exports, it still manufactures 60–70% of oil production industrial equipment domestically. Since 1992, Iran's Defense Industries Organization (DIO) has produced its own tanks, armored personnel carriers, guided missiles, radar systems, a guided missile destroyer, military vessels, submarines, and a fighter plane. In 2006 Iran exported weapons to 57 countries, including NATO members, and sold $100 million worth of military equipment abroad (Economy of Iran, 2012).

In spite of the striking achievements in production, but unfortunately owing to the mentioned cultural traits, national design has no place in the hierarchy of production; hence, design management remains as an impractical approach in local production domain.

CONCLUSION

This paper set out to address the following research aims: (1) reflecting the current status of design management in Iran and (2) drawing some meaningful conclusions for a more fulfilling future.

Using the data from five individuals and further documents, three aspects emerged which were introduced in the results section. The research aims are now revisited.

According to the identified needs and motivations, design management in Iran is infected both at the micro and macro level. The micro infection is due to the out dated educational system which sticks on a general design syllabus both for bachelor and graduate degrees. However, the macro level is injured due to the lack of cultural networks in the society which the greatest impact on the industry. More importantly the role of design management as an innovative and effective organizational success enabler is not served in the community. Accordingly, two scenarios for solving the complex situation are proposed:

- Enhancing the implementation of design management on the cultural pavement which includes: enriching the managerial skills, establishing the intellectual property protection, spreading the international market awareness for global competition, and promotion of design in public and business firms in order to increase use of design by companies.
- Management of industrial design in education system. For empowerment of designers with management skills, the discipline of design management should be included in educational curriculum. In this regard, educators would be professional in running their design practices. On the other hand management of industrial design in education process is essential for enhancement the mentioned complexity. The discipline of design management remains formally under-represented in educational institutions, and certificate programs. Design schools are forced to teach project management, entrepreneurship, marketing research, brand and a minimum of business administration. But being creative remains the more important issue. The power of management skills for design success is ignored. Theory and practice are regarded as separate aspects of education. Management of education should be applied in the territory of design to refine the theory/practice gap. In this regard, professional organizations should bring together the business leaders and designers to open the dialogue, focusing on the need for collaboration between business and design. Hence, some interviewees suggested the management of design education. They recommended specifying the undergraduate level into main branches such as transportation, interior, jewelry, and product design. Therefore the master degree would be beneficial for strategic orientations toward design management. On the other hand, some interviewees believed that it would be sufficient if design management be included in the current curriculum of master degree students as a 2 credits course. They persist on merging the theory and practice by strengthening the relation between universities and industries.

In order to implement the design management in a society it is not enough to know what design management is or how it works. Design management also needs some social networks. What we finally need is something like a surgery operation. By understanding the cultural structure and hidden layers it is more probable to be able to web the net. However, it would not be possible to conduct the operation in a single day. Further works need to be done to identify the potential in which Iranian design may play in Iranian business success.

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MITIGATING PERCIEVED PERFORMANCE RISK TO PROMOTE STUDENT ENGAGEMENT IN COLLABORATION AND INNOVATION ACTIVITIES

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It is often viewed that students, due to their lack of commercial responsibility, are free to take risk in their course activities and are intrinsically motivated to experiment and push boundaries. This may be partially true, however, students are increasingly driven to perform to their academic best. They feel that their university, peers, potential employers and industry measure them on grades. As a result they like to maintain control over their performance and will avoid risk taking in research, projects, group selection and team participation.
When teaching design, management, innovation and collaboration educators promote student risk taking to emulate practice and facilitate learning. Disconnect between educator and student goals and expectations can result.
This paper discusses practices developed by the first author to determine student concerns about risk taking, remove perceived risks to performance and encourage collaborative innovation.

Keywords: Innovation, Collaboration, Education

INTRODUCTION

The design management discipline is constantly growing & changing with many new theories, models & practices developing each year. It attracts postgraduate students to the College of Fine Arts (COFA) University of New South Wales (UNSW) from diverse professional backgrounds who are interested in either shifting from a design role into a more strategic position, understanding how design can be leveraged within organisations or non-designers who want to understand how to manage designers, design processes and design functions.

Design Managers work in environments that are in constant flux, in multidisciplinary teams, on complex projects. These projects are often called ‘wicked problems’ (Rittel & Webber, 1973). They are so complex that addressing any part of the wicked problem can create ‘sticky solutions’. These are solutions that may impact on the other parts of the problem or create new ones. Design Research helps us to understand the context of these problems and Design Thinking is an iterative process used to solve them. Designers use the design thinking process to define a problem, conduct research, apply results to ideate solutions, prototype these & test them against the project objectives, form strategies to implement successful solutions, reflect on results to learn from the process before redefining & starting the cycle again. This ‘whole system’ approach has proven to be very effective in delivering collaboratively developed, innovative solutions to ‘wicked problems’ (Buchanan 1992) and is one of the main methodologies taught in the design management major of the Masters of Design by coursework at COFA UNSW.

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As an educator, addressing the need to create opportunities, environments & cultures for learning as well as meeting individual student needs, institutional & industry requirements & balancing all these stakeholder expectations within the context of a fast developing & every changing field, is a 'wicked problem' I have to solve. I have found a design research approach very useful in determining our student's various, sometimes conflicting, needs. I then use design thinking to develop strategies for applying this knowledge to design, deliver, evaluate and iterate the design management, design practice, design strategy and innovation courses I coordinate. The aim of this is to provide an engaging & meaningful professional level education experience for our students and develop them as individual practitioners.

A NOBLE ASK

It is often viewed that students, due to their lack of commercial responsibility, are free to take risk in their course **activities and are intrinsically motivated to experiment, innovate and push boundaries. This may be partially true**, however, I find my students are increasingly driven to perform to their academic best. They feel their institution, peers, potential employers and industry measure them on their grade outcomes. As a result they like to maintain control over their performance and will avoid risk taking in research, projects, group selection, collaborations and team participation that they perceive could lead to reduced grades.

With the goal of developing the innovation and collaboration capacity of my students, I am frequently, and idealistically, asking my students to push the limits of their field as part of their learning process. I ask them to innovate in their approaches to research and practice (Beckman & Barry, 2007), collaborate with partners outside their own area of expertise (Adams et al 2009), co-create solutions to wicked problems, challenge their project briefs and undertake projects with uncertain outcomes. This often makes students uncomfortable as they feel they may not perform to their academic best. Ideally students would be intrinsically motivated by a love of learning and free to learn from failure if that is where their experimentation leads them. In the current tertiary environment this is neither realistic nor achievable. Students, particularly working postgraduates, are time poor and have to be strategic about their education. They are, understandably, in the main part, focussed on maximising their marks and minimising their time commitment and as a result averse to taking risk. This creates a challenge for any educator to find mechanisms through which they can support, or free, students to take risk in order to innovate, collaborate, experiment and learn.

An inherent conflict lies within the divergent learning preferences of the student and the educator. It provides opportunities for the development of innovative approaches to designing course structure, activities, assessment and delivery methods. As a first step the educator needs to understand student needs and motivations.

UNDERSTANDING STUDENTS– A LEARNING ACTIVITY FOR EVERYONE

Taking a User Centred Design approach (Jordan, 2001), I survey my students each semester on issues that I can influence as a course coordinator. These include factors that impact their learning. This provides valuable insight into how to improve my practice & their experience. Four key contributors have emerged over time. These are *delivery*, *experience*, *assessment* & *content*. They form a unique wicked problem for each course I teach where I need to create a better student experience. It can be used as a framework for course design, forming summative and formative tasks & linking assessment criteria with graduate outcomes.

Figure 1 The four contributors to student learning.

This activity is very useful for me when iterating courses for their next delivery but does not benefit the current cohort. I have found that by running a class service design, design research and action learning activity early each semester I can identify and address needs of the current cohort through adaptive curriculum development. This is an approach where I leave some flexibility in the curriculum structure to facilitate the inclusion or further emphasis on content that is of particular relevance to the current student cohort.

As a class we create student profiles, develop customer journey maps and select various other tools depending on what the class decides fits their needs. We then collaborate to use the results to pose a number of questions or frame a specific issue that we can apply design thinking models to.

There are a number of benefits to this approach.

1. Students learn how to use service design, design research and action learning tools.
2. Students learn how to synthesise research results into a question / problem.
3. I gain insight into student needs and experiences that assist in course iteration.
4. Students learn collaboration tools designing a class project to address the question /problem.
5. A collaborative class culture emerges.
6. Students feel they are being given some input in their course development and their needs are being addressed.
7. Students are involved in a practical design thinking project.
8. Students experience first hand the benefits of receiving a well designed, co-created service.
9. Students perceive the educator as innovative, engaged and able to practice what they are teaching.

UNDERSTANDING STUDENTS AND THEIR PERCEPTION OF RISK

The activity described above provides good learning experiences for the cohort and valuable feedback for the educator. It has consistently highlighted that the students are averse to exposing themselves to any risks with regards to assessment as they are focussed on their personal performance over their learning experience. When asked if they would prefer to receive a higher grade or enjoy a deeper learning experience 80% of students indicate they would opt for the higher grade. When asked what aspects of their courses they perceive to pose the most risk for their grades three key themes emerged. These are listed below and expanded to provide some detail.

THE CHALLENCES OF COLLABORATING WITH OTHERS

Team member, group member or collaborator performance may drag their overall grades down.

Working collaboratively takes more time than working independently.

Deciding who to collaborate with.

Approaching potential collaborators.

Finding a collaborator.

Fear of ideas being ‘taken’.

Previous bad collaboration experiences with collaborations

THE CHALLENGES OF BEING ASKED TO INNOVATE?

Uncertain if innovation has occurred.

Determining how benchmark for innovation.

Determining level of innovation.

Afraid of not being able to innovate.

Uncertainty over who will own the innovation.

THE CHALLENGES OF BEING ASKED TO EXPERIMENT?

Fear of ramification if the experiment fails?

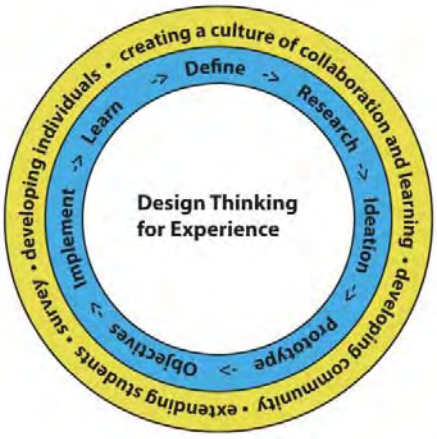
Defining what the outcome or success criteria should be.

Determining a process for evaluation of the outcome.

It is desirable for my students to take risk in their projects in order for them to learn innovation, experimentation and collaboration tools and techniques. By applying design thinking to the four contributors to student learning identified earlier, I have been able to develop a number of initiatives that have facilitated student risk taking.

USING DESIGN THINKING TO MITIGATE RISK: EXPERIENCE

Figure 2 Design Thinking for Student Experience



CHALLENGE:

How do I create positive learning experiences that develop in students a level of comfort with risk taking in order to be able to collaborate, innovate and / or experiment in their work?

RESEARCH:

The students want to learn these things but are reluctant to deep dive into them due to a perceived possibility of compromising their grades. This stems from

- previous poor experiences in team and group tasks
- uncertainty about how to form and maintain collaborations

ITERATED SOLUTIONS AND IMPACTS:

Assigning classes an overarching formative, meta collaboration project that they are all involved in has assisted greatly in developing a supportive class culture and a community of learners, sharers and collaborators.

One of the most effective meta collaboration projects has been assigning each class a course resource wiki. Students are asked to share, on line in a wiki, resources they have found useful and review their relevance and suggest who the material may also be relevant for in their class. These wiki projects have been running for 4 semesters now and are rolled over each semester for the next cohort to build on. Students view them as a very useful resource, are enjoying sharing information, finding it a great example of collaborating. Since instituting these wikis my students have been more comfortable with sharing their information with their peers in class as well as on line. They have been having deeper and broader conversations with each other about the materials they are using in their research and they are producing a better quality of work. These conversations are helping the students in forming collaborations with peers based on common interests that tend to work better that forced collaborations.

Providing extra curricular opportunities to learn about innovation, collaboration and experimentation is another initiative that is creating positive and extended learning experiences for students.

I keep a calendar of local events, visiting lecturers, talks, seminars, competitions and exhibitions that they can participate in or we can attend as a class. I also bring in guest lecturers to talk about their experiences and to workshop with the students

> *'The detail you have given in the lectures has opened my eyes to the extent of consideration I need to give to the practice of design. The guest lecturers have been inspiring.' Student 2007*
>
> *'Thank you for taking us to the "Is Innovation Good for Us?"" panel discussion last week. I really enjoyed the discussion and it raised many questions I would never have thought of.'*
>
> *Student 2012*

I have also been able to arrange special elective courses or seminars when international theorists visit Sydney. eg. Service Design special elective by Marc Stickdorn co-author of *This is Service Design Thinking* in 2011.

Students are applying knowledge gained from these seminars & special electives to their professional practice and getting great results. This enriches their learning experience and encourages them to promote the course to colleagues as a beneficial experience.

> *'I would like to express my appreciation & satisfaction with Summer Service design elective …I would give the process itself a huge rap …. We [a radio sports content*

production company] are in a phase of rapid growth & its [the service design model developed for his business as part of the course] effective implementation played a large part'. – A postgraduate student applying skills learnt in 2012 Service Design Elective.

USING DESIGN THINKING TO MITIGATE RISK : CONTENT

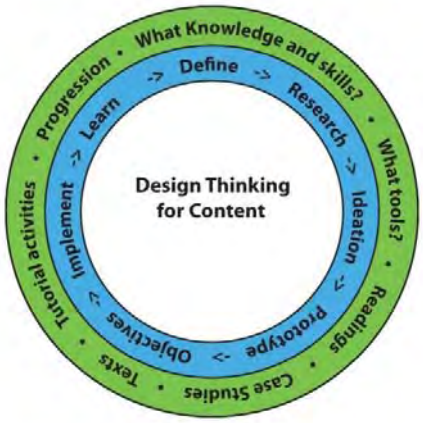


Figure 3 Design Thinking for Content

CHALLENGE:

Our students come from a diverse range of disciplines, cultures & literacy levels. They are time poor & performance focused which can make it difficult to get them to make the most of engaging with our course content particularly if they feel it diverges from their specific needs. How do we engage them deeply in the course content and encourage them to integrate their new knowledge in their practice?

RESEARCH:

Students are motivated to learn when they have readily accessible, current & relevant course content and materials. They appreciate organized & targeted material. They like to be part of an active learning environment & enjoy learning from their peer's. The course wiki project is exposing them to a lot of good material but sometimes they miss important basics.

Students sometimes pick up on new trends or changes in the discipline or have specific needs in relation to content not previously anticipated.

ITERATED SOLUTIONS AND IMPACTS*:*

Anticipatory content design: All course material, including lectures, is provided to students so they can come prepared each week instead of taking notes. This allows them to synthesize key themes prior to class and listen in the class and contribute in an informed manner.

Adaptive content design: Students are polled early in semester to ascertain specific professional interests & develop targeted content & activities for them to extend on core skills & knowledge.

Poll insights are integrated into lectures and expanded upon in tutorial activities. Links to relevant resources are provided as well as downloadable readings & PDF's of the lectures prior to class.

Participatory / Collaborative content design: Students are encouraged to contribute to the course content when they find material they view as relevant. This makes them feel like they are part of a supportive and collaborative learning community.

A combined course website making all resources accessible to all students has resulted in better prepared and more confident students, higher levels of participation in class discussions, growth of a collaborative learning community and a feeling of equity between local and international students. Students now bring print-outs of lecture notes to class so they can listen to & engage with the extended content rather than take copious notes. This particularly helps international students as theory, & applied practice examples of it, can be difficult to navigate in real time in their non-native second language. Students are finding it valuable and sharing and contributing content and engaging in broader disciplinary discussion. They are also less competitive with each other and happier to work together in teams.

> *'… Thank you for the semester! Although it is not over yet, I have really enjoyed this subject & discovered a strong point I didn't think I had. For your future tutorial groups & lectures, I thought this pdf of an article on the value of developing design cultures from the Financial Review may also be of interest to you, if you don't already know of it.' – Student 2009*

USING DESIGN THINKING TO MITIGATE RISK : DELIVERY

Figure 4 Design Thinking for Delivery

CHALLENGE:
How do I leverage course delivery to inspire experimentation, collaboration and innovation.

RESEARCH:
Students are inspired by engaging face-to-face lectures, applied tutorial activities that contextualize the theory they have learnt, access to lecturers to ask specific questions & having engaging professional discourse with their peers.

Students are more confortable engaging in activities if they have been provided tangible and successful examples of similar activities.

ITERATED SOLUTIONS AND IMPACTS:
2006 learn to program a content management system to develop a blended learning website to give students access to all materials across all courses and develop a learning community.

• 2008 swap to WebCT then to Blackboard in 2009 & Moodle in 2010.

• Create Facebook page so students can informally get to know each other, feel like one larger cohort and stay connected post course. This has created a good extended community around the courses.

• Develop a core set of lectures that can have locally relevant content eg. government policy & intellectual property easily added in to suit either cohort.

• Video guest lectures & provide all students access to them & an online forum to discuss their interpretations of the presentations with their peers.

Students are responding to well organized and current core theory supported by locally relevant cases & linking it to their own assessment tasks and professional practice. This has resulted in happier, more engaged students, who are confident in applying their new skills and knowledge in self determined assessment topics.

> *'Thank you for a great course … the structure & content is extremely practical & relevant with direct application to local context. … [it] has helped me to do a proper audit in a very systematic way involving researching, collecting, organizing & analyzing data for strategic branding … I am grateful for this course as this is extremely beneficial in my field of work, as this can be transferred into my work.' Student 2011*

USING DESIGN THINKING TO MITIGATE RISK : ASSESSMENT

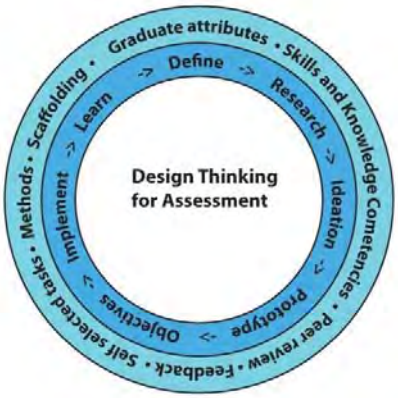


Figure 5 Design Thinking for Assessment

CHALLENGE:

How do I design assessment tasks to engage students, motivate them to learn & develop individual skills, contribute to peer learning & the development of the field?

DESIGN RESEARCH:

Students are more motivated to learn from assessment tasks when they can choose a subject that helps them develop knowledge around a topic relevant to them and benefit from access to examples of past, high quality, student work.

Iterated Solutions and Impacts:

Set assessment tasks where students can demonstrate their command of the key concepts, skills and knowledge taught through self determined projects that extend or support their practice.

Set formative presentation tasks where the students present their projects to the cohort for peer review that refines all of their critical communication skills. Formative assessment has boosted individual student confidence in engaging in innovation, collaboration and experimental project with their peers.

Collaborations are assessed on critical reflections of the participants regarding the collaboration rather than the outcome freeing the collaborators to experiment and diverge from the set brief where needed in order to innovate. (Rust et al 2007)

Peer led learning is occurring via peer presentations that have facilitated exposure to a greater variety of perspectives and scenarios, and in addition to a well structured and comprehensive lecture series, expanded student understanding of the field and it's possibilities.

> *'I feel that this course was such a pivotal part of my education here at COFA, & still has been the only class which completely changed me, helped me evolve as a designer & transformed my way of thinking.' Student 2011*

> *'[I]… wanted to say thanks for everything this semester, this was one of the best & most practical subjects & you really are a fantastic lecturer, we have learnt a great deal from this course.' Masters Student 2008*

Research project assessment stages emulate the stages of developing a research paper. Eg. Developing a self determined topic around a conference theme, abstract writing, peer review of abstracts, literature review, final paper submission, conference presentation.

Instituting peer review for all self-determined assessments has developed student ability to critically reflect on & evaluate projects. Quality levels in submissions & research outcomes have increased. Providing examples of high quality (Atkinson 2009) work from past students has build confidence in current cohorts to complete tasks and set benchmarks. The students have decided to hold mini conferences at the end of each semester & invite students from other related courses along to see what they have been working on and to understand what to expect if they take the course. Since 2006 nine student papers have been presented at international conferences or published in peer-reviewed journals from the research course. Drafts of the final research papers are published on the course website and help students understand the level of work required of them.

> *'Hello from HK! The conference was really interesting & the presentation went very well. Thanks again for putting in the abstract for me, this has been a really fantastic experience!. Masters Student 2011 presenting at a Design Management Conference*

The complex nature of the COFA cohort due to different cultural backgrounds, disciplinary experience levels and language ability as well as having multiple delivery locations and modes has created a challenge to design, develop and deliver a good student experience that will inspire collaboration, innovation and experimentation. Using design research methods to gain deep insights into COFA postgraduate design management student needs has been a very useful approach. It has provided high quality information to use when applying service design and design thinking methods to devise strategies to create engaging and equitable learning experiences for our students that develop them as individuals. A collaborative learning community has emerged and as a result students have become more engaged learners, producing higher quality work and contributing to each others individual learning experience and expanding research in the field.

ACNOWLEGMENT

I would like to thank my father, Emeritus Professor Ross Griffith for presenting this paper for me. He is a great innovator and collaborator.

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LEADING
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DESIGNING WITH OTHERS AND DESIGNING FOR OTHERS: ADOPTING NON-ESSENTIAL VIEWS OF CULTURE IN DESIGN MANAGEMENT

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In this paper it is proposed that designers should be introduced to and versed in a non-essentialist understanding of culture, as opposed to an understanding of culture as having essential qualities. It is argued that 'essentialism' leads to stereotyping of *others* which leads to 'normalisation' as opposed to celebrating and harnessing diversity. The rationale for the importance for designers of a non-essentialist understanding of culture is twofold: Designers are designing with *others* and they design for *others*. When designing with *others* designers should to be skilled in intercultural communication which is informed by processes of 'representation', 'othering' and 'identity'. We will use a recently completed international project to examine communication practices of upcoming designers in this project in relation to these three processes. We conclude that although the project provided them with an opportunity to experience working across cultures their intercultural communications generally exhibited essentialist approaches in regard to 'representation', 'othering' and 'identity'.

Keywords: Intercultural communication; cross-cultural collaboration;

INTROCUCTION

In the first section of the paper we outline changes in design work practices and the need to introduce designers to non-essentialist notions of culture as opposed to the idea that culture has essential qualities. Then we introduce a recent international project undertaken within the Global Studio. We will use a recently completed international project to examine communication practices of upcoming designers in this project in relation to these three processes of 'identity', 'representation' and 'othering'.

DESIGN PRACTICES

The rationale for the importance for designers of a non-essentialist understanding of culture is twofold: Designers are designing with *'others'* and they design for *'others'*.

DESIGNING WITH OTHERS

Designing with *others* takes place when designers are working in cross-functional teams (Achiche, Howard, McAloone, Deng, & Baron, 2012; Gericke & Blessing, 2012) with members from different organisational functional departments or in cross-disciplinary teams with members with different disciplinary backgrounds (Poggenpohl, 2009) or in intercultural teams in which members are distributed geographically in different organisations and even countries (Eppinger & Chitkara, 2006,

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2009; Marcus, 2009; Maurer & Valkenburg, 2012). In any of these instances designers working with other team members will be engaged in intercultural communication. The Design Management literature highlights the importance of communication (e.g. Hart, 1995) and the ability of designers to work in cross-functional teams (e.g. Borja de Mozota, 2003; Hart, 1995) as factors impacting on the successful execution of design processes. Therefore, designers will need to develop skilled communication strategies and principles for working in cross-cultural contexts to become skilful in intercultural communication and to avoid falling into an essentialist trap. This means that designers will often be working in culturally diverse teams.

Holliday, et al. (2004:2) suggest that intercultural communication should grow from an understanding of people, culture and society generally. It is argued that this is closely related to how one views culture, which in turn is informed by processes of 'representation', 'othering' and 'identity' (Holliday, et al., 2010).

According to Hall (1997:15) "[r]epresentation is an essential part of the process by which meaning is produced and exchanged between members of a culture. It *does* involve the use of language, of signs and images which stand for or represent things." He suggests that "[t]he concept of representation has come to occupy a new and important place in the study of culture. It connects meaning and language to culture" (Hall, 1997:15).

Othering or *Otherization* is a process through which people distinguish themselves from other people. Holliday, et al. (2004:157) refer to this as "the contrastive (Other) as a way of arriving at an understanding of who they are." In other words "Otherization is used to describe the process that we undertake in ascribing identity to the 'self' through the often negative attribution of characteristics to the 'other'. (Holliday, et al., 2004:159) For example, I know I am a Designer as I am not an Engineer. These views are generally informed through *representations* of the *other* in the media and "[i]t does not permit the negotiation of identity between people, but imposes crude, often reductive identities on others" (Holliday, et al., 2004:159).

Identity is […] not in essence a stable concept, but one that is achieved through the skilled manipulation of discourses in society." (Holliday, et al., 2004:18) They suggest that "people are creating and indeed negotiating their cultural identity in the very process of communicating with us" (ibid:19) and argue that "the essentialist view denies the complexity of one's identity and society" (ibid:11)

In other, words rather than thinking of culture as fixed, the non-essential view suggests that it is always in process. An essentialist view of culture presumes "that there is a universal essence, homogeneity and unity in a particular culture." (Holliday, et al., 2004:2). Graham (1990:54) stated that:

> *Essentialism is the intellectual presumption that complex realities of any sort are ultimately reducible to simpler, or essential, realities. Thus, an individual might be essentialized as fundamentally greedy, or a relationship as basically sexual.*

Holliday, et al. (2004) suggest that 'essentialism' leads to stereotyping of *others* which among other things then "drives sexism and racism" (p.3). We propose that essentialist views of culture lead to 'normalisation' as opposed to celebrating and harnessing diversity.

DESIGNING FOR OTHERS

Following the work of Bourdieu, du Gay, Hall, Janes, Mackay and Negus (1997:62) stated that: "Designers are key **cultural intermediaries**" and in this role they "play an active role in promoting consumption through attaching to products and services particular meanings and 'lifestyles' with which consumers will identify." Thus, as they are involved in designing for *others* (i.e. clients/consumers/users), designers need to develop an understanding of how the *others*, who consume these products and services, are making meaning from these.

According to du Gay, et al. (1997:62) Designers are not just designing functions they are designing "*symbolic* goods and services".Again this is closely related to how we understand culture and how we can make a sense of how artefacts are informed and are informing 'culture'.

One implication is that "meaning is constructed through cultural practices" and this is applicable to not only those consuming the products and services but also for those who are actively involved in production of these products and services such as designers. Designers "are concerned to create an identification between producers and consumers through their expertise in certain signifying practises" (du Gay, 1997:5).

The above is echoed by Buchanan (2001:14) who suggested that what

> *has changed in our understanding of the problem of design knowledge is greater recognition of the extent to which products are situated in the lives of individuals and in society and culture. This has given us two areas of exploration that are, in a sense, mirror images of the same problem. On the one hand, we are concerned to place products in their situations of use. The product then is a negotiation of the intent of the designer and manufacturer and the expectations of communities of use. The product is, in essence, a mediating middle between two complex interests, and the processes of new product development are explicitly the negotiation between those interests.*

This means that meanings of the products are, as Buchanan puts it, *negotiated* rather than determine at the outset. Therefore, designers need to be aware of processes how these meanings are negotiated through interconnected processes within the circuit of culture.

THE GLOBAL STUDIO: INTRODUCTION

We will use one of the international projects recently undertaken within the Global Studio (http://theglobalstudio.eu) where upcoming designers practice working with international colleagues, to examine their communication practices in relation to the three processes of 'representation', 'othering' and 'identity'.

The Global Studio was developed as a response in the subject area of design to shifting trends in manufacturing. It is delivered using a blended learning approach with a combination of online learning and face-to-face teaching. An important aspect is the incorporation of Web 2.0 technologies to facilitate communication between the students (Bohemia, Harman, & Lauche, 2009).

One of the key ideas within the Global Studio is to link student teams across the globe in designer and client roles to undertake a design development project (Bohemia & Harman, 2008). These roles are described in more detail in later section of this paper. The outcome of this is 'that, throughout the project, collaborating students are co-dependent on one another's inputs' (Bohemia & Ghassan, 2012:113). It also means that the activities within the Global Studio require students acting as designers to familiarise themselves with the local culture and practices of their client. This necessitated intercultural interaction that is based around and integrated with student's project tasks (Montgomery, 2010) and their assessment (Bohemia, Harman, & McDowell, 2009).

Both timing and length of these projects varies from project to project. For example, the length of the shortest project lasted for 6 weeks and the longest project lasted for 16 weeks. This time is inclusive of when students are introduced to the overall project and the online environment which is done during the first week, and the last week is used to conduct synchronous presentations between the paired student teams from across the partner universes. An example of a weekly project schedule is provided in Table 1, on page 5.

Since its launch, the boundaries of the Global Studio have continued to expand through the delivery of unique teaching projects with the collaboration of leading international academic and industrial partners (Bohemia & Davison, 2012). *The Festivals, Fairytales and Myths* project referred

to in this paper is one of these initiatives, developed and conducted in partnership with universities across the world.

The students participating in the project were all studying in the creative industries; however, students within each of the institutions were undertaking different degrees both as a subject area and the level of the study. For example, the project incorporated students from: product design, transportation design, craft design, design management, multimedia design and graphic design and students from first year to a Masters level.

THE FESTIVALS, FAIRYTALES AND MYTHS PROJECT

The *Festivals, Fairytales and Myths* project was a nine week long international collaborative project undertaken during the 2011/12 academic year (January–March) between six universities located in the Japan, Korea, China, UK, France and USA. Exactly 150 students divided into 40 teams (see Table 2) and 12 supervisors have participated in this international project. This was the 9th project undertaken within the Global Studio.

As outlined above, students in the projects undertook a dual role, as clients and as designers for their counterparts located at other universities and their counterparts did the same for them. That meant that every student team had the responsibility of defining deliverables and outcomes. The teams had to deliver a proposal to fit the project brief outlined by their Client group. Although, a master project schedule was provided for all the participating students outlining weekly deliverables (see Table 1, on page 5) every team was responsible for documenting their weekly progress and associated information on their dedicated project websites. The client and designer roles are outlined below. The project provided students with an opportunity to investigate their own and their collaborators' cultures in relation to Festivals, Fairytales and Myths.

CLIENT ROLES

The students tasks as Clients was to commission designers to provide them with a design concept of an item, which either promoted and/or celebrated a local Festival event, Fairytale or Myth. It was their responsibility to research and identify specific local practices associated with a Festival, Fairytale or Myth and to provide their collaborators (designers) with a design brief. This brief was meant to be informed by the clients research. When describing for example a festival, students were encourages to touch on the following points: how is it 'regulated'; how and by whom it is 'consumed'; how and by whom it is 'produced'; how is it 'represented' and 'circulated' in for example in media. In this role they were also responsible for constructing a physical model that was be based on the proposal developed by their designer group and guided by clients brief and feedback.

DESIGNER ROLES

As a designer, students were asked to respond to a client design brief. During the early stages of the design process they were provided with a chance to clarify the tasks with their clients before they finalised the briefs. They were required to propose a design concept of an item, which either promoted and/or celebrated the Festival, Fairytale or Myth as specified by their clients. As they were addressing issues in a different cultural context, they were encouraged to use their clients' local expertise to provide them with information in order for them to successfully address the given issue. As designers, the students tackled very diverse projects set by their collaborators within their client design briefs. These ranged from providing a safety product for music festivals, to promoting science festivals, to promoting a festival celebrating Charles Perrault, as outlined below:

> *Their brief was asking us to design a mask based on a fairy-tale created by Charles Perrault for a festival celebrating his stories. They wanted to advertise the fact that Perrault was the creator of these stories not Disney or Brothers Grimm who the rest of the world associates them with. So by creating this opera styled mask we were creating*

an authentic representation of the tales produced by Perrault and everyone attending would need to acknowledge this as it was also their ticket. (re1F)

Table 1 Weekly student teams activities performed as Clients and Designers.

Week	Client Roles	Designer Roles
1.	Research potential directions for the project. As the client you will undertake research into the theme (festivals etc) in order to inform the brief. Get to know your collaborators via Skype and project site! Provide information about yourself on your project site and develop a logo for your team.	Arrange to meet during week 2 with your Clients
2.	Provide your designers with the first draft of the design brief	Review design brief and ask for clarifications
3.	Provide designers with the agreed design brief including associated visuals / photos / videos	
4.	Provide feedback to designers on their initial concepts	Develop 3 individual concepts addressing clients' design brief
5.	Provide feedback to collaborators on their refined concepts	Develop refined group concept addressing clients' feedback. Provide 2 potential concept variations.
6.	Check the uploaded patterns and instructions on how to construct and assemble the proposed objects from the collaborators	Supply to your clients with agreed deliverables. These should include: technical drawings, instruction on how to assemble the model, description of how the proposal is distributed, used and disposed or re-appropriated
7.	Construct proposed objects (video this process and take notes in order to provide a critique to design collaborators)	
8.	Evaluate the design collaborators' concept validity. Organise a photo shoot of the constructed object. Develop a maximum 60 second promotional movie of the product used by its intended users (using prototype which you have constructed), and provide feedback to collaborators; through 4 minutes video which needs to include: 2) outline in what areas the design missed 3) addressed the brief criteria outline in the design	Review promotional and evaluation video from your Clients
9.	Provide feedback (via Skype / videoconference) to your collaborators in regard to their proposed design concepts	Respond briefly to client video. Submit 1500 words individual reflective account on what strategies you as a designer have incorporated into your practice to address contemporary cultural influences.

METHOD

Data that informed the study were collected from student via surveys, project websites, and reflective essays. Surveys were collected at midpoint and at the end of the projects (see Table 2). For this project the surveys were made available to participating students on online. The surveys consisted of questions, most of which included Likert-scaled items, on perceptions about the activities at various stages of the project, including tasks such as writing the design brief, virtual communication, designer–client interactions, and cultural awareness. Students were prompted to qualify each of their answers by adding text. The questionnaire also included open-ended questions.

In addition, groups Masters students studying at the English university were tasked to follow two of the paired groups to analyse their interactions using the concepts of 'identity', 'representation' and 'othering'. Comic strips were used by these students as one of the ways to illustrate interactions between the distributed teams.

The total number of retuned survey questionnaires at project midpoint was 48% (n=72) and 42% (n=63) at the end of the project. Compared to previous return rates these numbers were relatively low. This might be attributed to the fact that in previous years student surveys were distributed in a paper format during the classes, rather than online as for this project. There were no surveys received from students located at the USA university as that class withdraw from the project.

Table 2 Number of surveys received from students participating in the Festivals, Fairytales and Myths project

2011/12 Festivals	Japan	Korea	China	England	France	USA	Total
Number of groups	3	6	6	20	5	6	40
Number of students	6	21	25	60	19	19	150
Returned number of surveys, mid-project	5/83%	9/43%	17/68%	27/45%	12/63%	2/11%	72/48%
Returned number of surveys, exit	4/67%	9/43%	21/84%	25/42%	4/21%	0/0%	63/42%

RESULTS

General student feedback indicated that most (83%, n=52) students perceived the Global Studio to provide them with comparable or better learning experiences as in other modules. Close to 90 per cent (n=56) of students felt that the projects prepared them for future design collaborations across distance. Those who felt that the project did not prepare them for future design collaborations across distance indicated that they did not have a chance to communicate with their counterparts as much as they would have liked to, or that they would not get motivated by their counterparts or that they focused on other classes.

In general, students indicated that the project provided them for the first time an opportunity to experience what it might be like to work at distance with teams located in other countries as indicated by this student:

> *Yes, i now understand what future problems may arise and the whole experience has better prepared me for international collaborations, something we don't experience during in house projects.* (q14e8nF)

and another student touched on this in their reflective account:

> *Based on what I have learnt in this project I do feel more confident in working with international collaborators; especially since we had the challenge of dealing with the extreme time difference, and over coming the difficulties those language barriers present. Therefore, by collaborating with students where the distance was to the extreme, I hope that in the future I will feel more prepared for design collaborations across distance, whether it be again somewhere as far as Japan or on the other hand a company (person) based in the UK but a few hours away from where I am based. Overall, I would definitely recommend that the project should be given to other years' because it was very exciting working with students across a distance especially since no other project requires us to collaborate with overseas student.* (reA15F)

Although most students identified communication to be one of the key elements for successfully completing the project they also indicated that they needed to improve in this regard as explained by these two student quotes:

> *Looking back on the project I learned that when working with people from different nationalities and cultural backgrounds clear communication is the key element to a successful project, as this is the best way to guarantee clarity and a good understanding of each other from both sides. I also learned what it would be like to like to work in a genuine design scenario with clients and expectations that they have of you, like deliverables and meetings etc. I enjoyed this experience even though I found it challenging, I would love to try something like this again perhaps in a more detailed business sense as I feel I can take what I have learned from this challenge and put it into good use with another group or client. The feedback session allowed me to evaluate what we did well and what we could improve on next time, the actual final skype meeting itself helped me see how sessions like this are carried out in companies all over the world in board rooms like the one we used, in conclusion I will take what I have learned*

> *from this project and put it into practice on other modules and hopefully into business and my work after University.* (reJ10F)

> *The collaborative project with […] university was possibly the most insightful, yet challenging projects I have done to date. From the onset our group was faced with cultural and language differences which hindered communication and at times caused misunderstanding. Despite this the project allowed me to experience working with a foreign client and allowed me to develop my skills in communication by starting to understand how to minimise confusion between designer and client from opposing backgrounds/cultures.* (re6F)

While most of the students felt that they needed more verbal discussions with their counterparts using videoconferencing platforms such as Skype, a few students felt that this was actually a hindrance, as indicated for example by this student:

> *From this project I have learned that working with foreign collaborators, communication is key. Relevant strategies must be used to minimise communication issues and problems. In this project we used a range, varying from verbal skype meetings to written emails. I feel the written methods worked best as it was easier to interpret what both groups have said and meant, also it was easier to reflect back upon the key elements and points taken at that particular time. Whereas using Skype, due to language barriers, many things may have been taken out of context, leading to problems later in the project – as proven with finalising our designs. In hindsight, both groups should have communicated solely on the word press site, as this would provide a timeline of both written and visual references that we could reflect upon at any time throughout the project. In other words a mixture of strategies to improve communication proved to do the opposite as a lot of information seemed to get lost in translation.* (re6F)

Students also associated their experiences gained in the project with the contemporary design practices: Outsourcing to the far east is rather common, having tried a version of that and experienced first hand the problems with it, seems valuable. (me19)

COSTRUCTING IDENTITIES

Through the project activities students were engaged in constructing their identities. For example, from the very start they were asked to provide an introduction about themselves on their specific project sites. They were also asked to develop a logo for their teams.

The following explanation for the symbolism behind their logo was provided by a student in France:

> *I designed the logo after our group brainstormed on what could be a strong French symbol with historical and mythical value. We chose the name Les Arcs, which means 'The Bows' because it has several connotations. Firstly it ties to Jean D'Arc, who was a very famous French female saint, who lead the French armies in the hundred years war under the guidance of God. She symbolises French fortitude, rebelliousness, myth linked to historical events, and religiosity. Also, Arc means arch, for example, the Arc de Triomphe which is a very famous Parisian landmark. And finally, the bow and arrow symbolises battle, unity, rebellion, and appears in many mythical stories in many cultures. Visually, the two bows and their arrows create a French flag by using red and blue colouring with the white space separating the two. For us it represents our direction and French connection to the project brief we wish to achieve with our [English] counterparts.* (WPg1F)

Although, students were provided with basic points to touch on when providing their online introductions, such as name, photo, course, future professional plans and contact details, not all addressed all the points which in some instances had undesirable effects, as reflected by this student:

> *We kicked off the project with the initial introduction to our collaborators in […] China. In hindsight it is clear that the way our group approached this could have had an effect on later communications. We over simplified our initial introduction and didn't upload any pictures or much personal information; we just delved straight into the brief. I now see that it is critical to engage with a collaborator on many levels to create a harmonious working partnership. With the [addition] of language barriers and virtual communication it was crucial to approach the [Chinese student] group in a more friendly/casual manner. The whole project relied on people replying efficiently and coercing with each other on a regular basis, a friendlier approach would have been appropriate here. In design it is also important to build contacts, and create a repertoire of people that you can call upon. That is why it is important to create a friendly foundation when approaching a project like this.* (reR7F)

Throughout the project the students were 'actively' constructing their particular identities. For example, in their profiles they described themselves as being 'creative' or 'energetic' and in many instances getting into a trap of stereotyping of oneself in these descriptions and accompanied photos supporting specific images of self-representation of for example a 'professional' designer:

> *I found it hard to make my profile, as I wanted to be professional but still show my enthusiastic personality and funny side. Getting the balance right gave me the chance to get used to making a profile for myself when working with different people, consultancies etc. in the future.* (re15F)

In addition throughout the project students were shifting between the two key roles/identities of Client/Designer (see Figure 1 below).

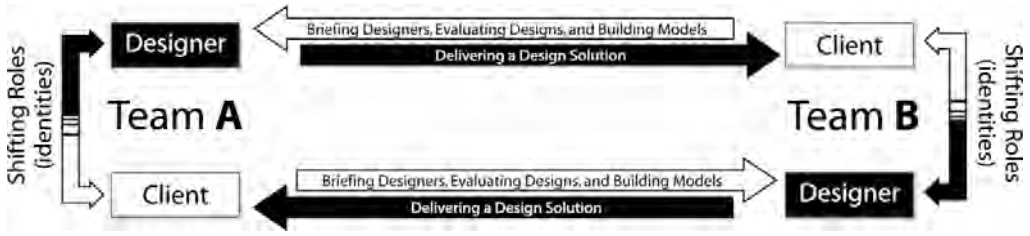

Figure 1 Shifting students identities

Most students, perceived this to be beneficial as undertaking both roles allowed them to better understand what could be required from them as Designers as described by these following student quotes:

> *at first I don\'t quite understand the reason to distribute us as designer and client and the same time, it puzzled me. However after a while, I realized the mode of communication. It just added our experience from 2 different aspects.* (q5eT39F)

> *Over the course of this project I have learned quite a lot that I will try and incorporate into other projects that I will be doing, the first thing I learned was actually being a client as well as designer. So I was able to experience both sides and the difficulties in communications and getting the correct information to gets stuff done, also giving the*

correct information so that the designer can get everything you ask for in the designs. (re14F)

In addition many of the students liked the fact that their counterparts as designers responded to the given design briefs in a diverse and sometimes unexpected ways as illustrated by this quote:

Playing both the role of designer and client was a beneficial experience. As the client, we wanted to create a brief that was open to allow for exciting and unique ways of responding to it. This also gave us the opportunity to see how different cultural backgrounds may influence their design and thought process. […] writing a brief for other people to work from was harder than first anticipated, as you have to ensure clarity in what you have written and what you are wanting as a client, particularly when there is a language barrier. This did cause some problems as we forgot to state that we were restricted to using the laser cutter, which inevitably caused confusion when receiving their initial ideas. However, once these mistakes were corrected I do feel our brief was a success as we received a diverse range of ideas and a final concept which was exciting and fitting to Newcastle's Science festival. (re17F)

For most of the students the role of a client and undertaking activities associated with writing a design brief was a new experience which they found challenging:

We worked both as designers (creating an artifact in response to a design brief), and as clients (asking our collaborating team to do the same for us). It was challenging because it is somewhat difficult to work efficiently with a team when you cannot physically see and explain to them what you want or what they expect from your work. However, this is also what made this experience a particularly enriching one, as we learned to acquire new skills regarding the ways in which one can efficiently manage a team and project over long distances. (q3mp49F)

A couple of students experienced difficulties with 'shifting' between the two roles as indicated by this student: *we two group should act only as designers or clients and the others play another role. not exchange role, it`s too chaotic.* (q3eT40F)

DESIGNING WITH OTHERS

For most if not all students this was the first opportunity to work with peers from outside their institutions and programmes. Most students indicated that they liked this component, although, many students commented that working with students from other countries including other design programmes was at first daunting:

At the beginning of the project the prospect of working with foreign clients seemed a somewhat daunting task. However after completing this project I am slightly more confident at the thought of repeating this sort of project in the future. I feel I have learnt a great deal in terms of cross-Cultural communication. (re6F)

They also commented that the difference in thinking, values, approach, styles, media, views and understanding these students brought to the project made it interesting. They also found how their collaborators reinterpreted their design briefs interesting and in turn how they reacted to proposed designs intended for their cultural context as outlined by these comments:

The element of this project that I enjoyed the most was seeing how students from another country and a completely different cultural background would choose to interpret our design brief, what ideas and designs they would generate and how they would develop these ideas. It was also interesting to see how they interpreted our ideas and

> *how they felt our designs would fit into a traditional Japanese festival. Additionally I think it was interesting to see how they presented their design ideas to us and what media they made use of to do this.* (reM15F)

> *Overall, I felt this project was very interesting and a clever idea, to get teams of students to work together and not let world location hinder creativity, ideas and inspiration. It was a great experience which offered a lot in terms of culture and views into how other teams and people work, and also how teams of people who are culturally different and from different backgrounds, can work together and come up with a good design outcome.* (re4F)

In many instances students as clients were selecting their themes and constructing their design briefs with a particular solution in mind:

> *Another thing I will keep in mind for further similar projects, is who I am writing a brief for. We wrote our brief completely from our own perspective, and I would dare say that they did the same. Neither team really considered who they were asking to accomplish the task, but instead wrote a brief that they would enjoy working to themselves. As designers all of us also had a clear idea of what we wanted, but did not really share this with the other team as well as we could, in order to leave them more freedom. I feel that this "freedom" was a bit false however, as both groups had an idea in mind, that they tried to direct the designs towards, without fully explaining exactly what they really wanted. It would have been interesting to see what the outcome would have been had we given them our initial idea as a starting point.* (reN15F)

REPRESENTATION

Students engaged in processes of representations both as clients and as designers. Although most of the students as clients selected an event that they personally attended, nearly all groups resorted to use information and photos from promotional events websites to illustrate their chosen festival in their design briefs to their designers (see Figure 2). Through appropriating these texts and images they would reproduce 'stereotypical' cultural identities of the festivals participants, the consumers of these events, as propagated by the event organisers. Then, as designers, they would re-represent these user/consumers characteristics in their design concepts, thus, not being able to move beyond the given 'stereotypical' cultural identities.

Figure 2 Use of popular media Representation

As the project progressed many have found that these stereotypical representations were guiding their counterparts to solutions which were not meaningful to clients, as for example, outlined by this student:

> *Festival we chose was the 'Junior Great North Run, this addresses more of an issue within society which is that "physical activity is an essential factor in improving our children's health and preventing a possible risk of heart disease in the future."Our collaborators didn't understand the meaning behind our festival and this caused them ask questions such as 'Is there any special aspects of your local area', they seemed to seeking a meaning behind the run when the point of the event was to promote physical activity for children. We should have been more aware of this cultural difference when setting this event to design for, and therefore been more clear in communicating the run as a way to promote physical activity in children instead we linked the run to Newcastle city and we didn't promote the runs individual identity as much as we should have done.* (reA12F)

OTHERISATION

In various ways representations of others led some of the students in otherisation of their collaborators and the prospective consumers.

> *Another thing I will keep in mind for further similar projects, is who I am writing a brief for. We wrote our brief completely from our own perspective, and I would dare say that they did the same. Neither team really considered who they were asking to accomplish the task, but instead wrote a brief that they would enjoy working to themselves. As designers all of us also had a clear idea of what we wanted, but did not really share this with the other team as well as we could, in order to leave them more freedom. I feel that this "freedom" was a bit false however, as both groups had an idea in mind, that they tried to direct the designs towards, without fully explaining exactly what they really wanted. It would have been interesting to see what the outcome would have been had we given them our initial idea as a starting point.* (rep6F)

Student mode of communication with their counterparts led to exclusion of some members from the conversations which impacted on them negatively as outlined by this student:

> *Although they did provide files and feedback through the emails they were not uploading anything on the blog or contacting me and the third group member. There wasn't a reason for this but it made me feel disconnected from the project, and didn't allow me to be part of this stage of the project.* reC14F

DESIGN FOR OTHERS

During the project students were designing for others in terms of the clients setting design tasks including proposed end consumers. Through the project the students needed to negotiate with their counterparts what it was they anticipated and whether the proposed design solution(s) would address *clients* anticipated outcomes outlined in their briefs and outlined by this student:

> *The collaborative project with […] University has proven to be one of the most diverse and stimulating modules that we have or I have encountered as a design student. It has opened my eyes to a whole new perspective on design as a process and how different cultures and media can be ambiguous if not fully defined by set outlines agree by all. Being a Chinese University, the obvious hindrance is the language barrier as neither group had an understanding of one another's language on even a basic level and therefore meant that information at times caused misinterpretation. On the other hand it has helped me to progress on a level such that, I now can be critical when presenting*

> *work by understanding how to minimise ambiguity as designers to manufacturers to clients all across the globe.* (re6F)

Most students found it useful to design for other cultures as it provided them with an opportunity to move beyond their immediate context:

> *… as far as culture is regarded, I feel that it is projects like these that can a do require us as designers and people to come out of our own 'little bubble' and truly appreciate others principles and values.* (re6F)

They also liked the opportunity to design for consumers in unfamiliar cultural settings:

> *The festivals group assignment has been an experience different to most university projects I have done, with both ups and downs. The main aspects differentiating it were the difficult communication, doing teamwork across a distance, and the very unfamiliar culture that we were designing for.* (rep6F)

> *We can learn from other cultures. In this project we are made to design for one. This means we have to put our design practice in that context which was challenging. It is good to learn about different materials, processes, craft forms, ideas and philosophy. It has introduced us the system of globalised design.* (q5me18F)

CONCLUSION

Activities undertaken by the students within the project as clients and designers in collaboration with their international counterparts afforded the students with learning opportunities to experience and reflect on their experiences of working with *others* and designing for *others*. Through this exposure they began to appreciate some of the challenges related to this work environment but also how the learning gained from the project could improve their design processes and untimely their design outcomes as articulated by this student:

> *Within design I see society and culture as the main driver for products, the ability to fully encompass a knowledge for someone else's culture will make you a well rounded, better designer who creates more effective designs that have an impact on peoples lives.* (reR7F)

Although, most of the students have undertaken these processes for the first time and found them to be challenging they began to appreciate the others in a different light. They also began identify some of the limitations associated with working at distance:

> *Advancements in technology allows us to work alongside people from all over the world without having to meet in person, but this project made me question whether this is entirely for the best. It is as difficult to form a relationship or understanding of a person when you do not meet them in person as it is as easy to not make too much of an effort to find out more about the people on the other side. Time restrictions and other commitments makes 'small talk' hard to evoke, paired with awkward time differences. I learnt that working in a long distant team can often make projects take longer than they should, as time difference can mean you could not receive/make a reply till the following day, which can sometimes be problematic when trying to meet deadlines.* (re17F)

Overall, students from all the participating universities found it extremely challenging regardless whether they shared English as a common mother language. One of the Masters students who observed the cross-cultural teamwork as part of one of their module assignment represented

difficulties faced by teams in the comic strip included below. In this comic strip they represented diverging communication across the teams located in England and States. These diverging communications were represented as mining shafts facing different directions and in the process of ‘digging’ these ‘tunnels’ unearthing various ‘skeletons’. The comic strip is using various metaphors to illustrate the challenges these two particular groups faced.

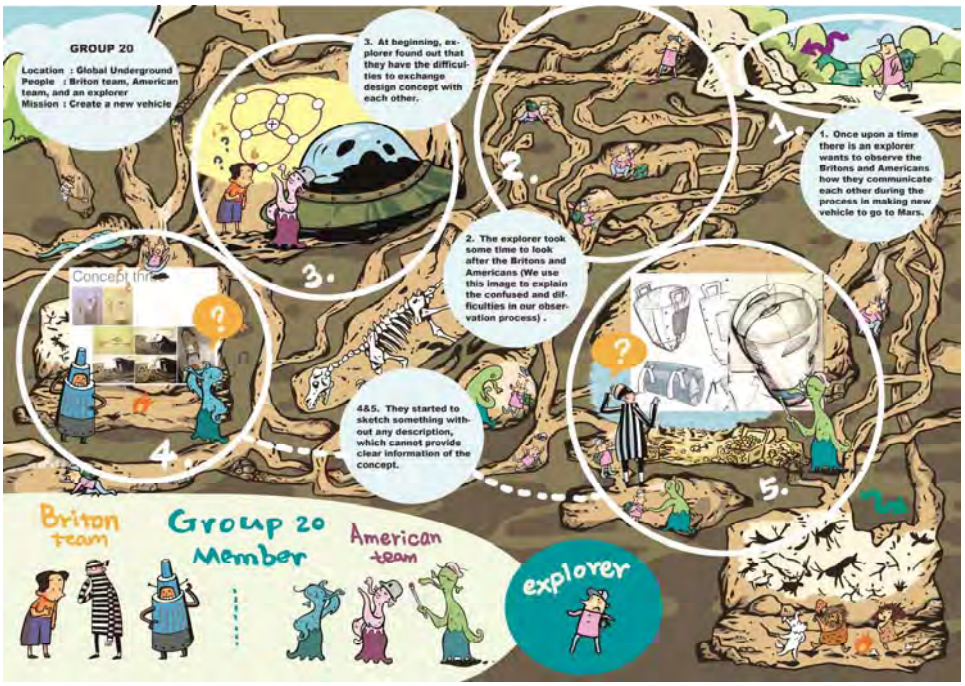

Figure 3 ‘Global Underground’
Produced by: Hu Jie (2012)

Figure 4 Representation of intercultural communication issues across teams
Produced by: Hu Jie (2012)

Although, the project exposed students to complexities associated with culture and provided them with an opportunities to reflect on their experiences it is questionable whether they gain sufficient understanding to become skilful in intercultural communication. I agree with the students

comments that as this was the first time they were exposed to this type of working environment it would be beneficial for them undertake again a similar project to implement what they learning from this project. I also think that the hands on experiences as useful they might be should be supplemented by providing students with readings which would help them contextualise their experiences.

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LEADING
INNOVATION
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IMPACT OF INCLUDING DESIGN THINKING COMPETENCIES IN MANAGEMENT EDUCATION – AN EXPERIMENTAL STUDY

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This Research paper presents a case where the impact of including "Design thinking" oriented subjects in management education was assessed. A research study was undertaken where Design thinking inputs were systematically induced into the management curriculum through changes in the curriculum and pedagogy. Learning outcomes of students undergoing these courses were examined to determine whether the approach created any significance difference in these students as compared with the students of a conventional Management program. The results showed that inclusion of Design thinking oriented subjects does enhance creative thinking & Innovative thinking competencies in the students which makes them holistic managers.

Keywords: Business Design; holistic thinking in management education, Design thinking in management

INTRODUCTION

New economic models, technological advancements and societal changes over the last few decades have brought new paradigms in business. However, the practice of management has not changed much since the time it was first defined by Henri Fayol in 1917 as planning, organizing, commanding, coordinating and controlling. According to Hamel[i], it still entails setting the objective, motivating and aligning effort, controlling and coordinating activities, developing and assigning talent, accumulating and applying knowledge, amassing and allocating resources, building and nurturing relationships, and balancing and meeting stakeholder demands.

According to a UN research[ii] undertaken in 2002, some of the key competencies required in management were determined as:-

- Analytical thinking
- Decision making
- Problem solving
- Achievement orientation
- Organizational awareness
- Result orientation
- Customer orientation
- Leadership
- Strategic thinking

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While most of the above competencies relate to the left brain hemisphere, that deals with logical reasoning, sequential, rational and analytical thinking, objectivity, and looking at parts, it is increasingly becoming important for the new age individuals to stimulate the right brain hemisphere that is responsible for holistic thinking, intuitive thinking, holistic synthesizing, and creativity[iii]. Gardner's[iv] research shows that different intelligences are required to know the world fully, these include the logical-mathematical analysis, language as well as spatial thinking & musical thinking. Some authors like Daniel Pink[v] have propounded that the right-brainers with competencies like design, story telling, symphony, empathy, play and meaning will rule the future by complementing the more traditional left-brain senses like function, argument, focus, logic and accumulation.

WHOLE-BRAIN THINKING IN MANAGEMENT EDUCATION

Several suggestions have emerged about the missing right brain competencies that need to be nurtured for the new age managers and leaders. Johanson & Woodilla[vi] and Dewett[vii] emphasized the need of Creativity and Innovation at different levels of management. Hermann & Nehdi[viii] accentuated the role of creativity in strategic thinking at the top management level. The importance of thinking like a designer in terms of holistic and abductive thinking was highlighted by Martin[ix]; and Brown[x] suggested that focus on design thinking would be a good business strategy. Hamel highlighted that the relative contribution of creativity in value creation in management was only second to passion; all the other competencies came lower in the chain.

A survey of the documented research in this area brought up three major categories of thinking that formed the right brain thinking competencies, they being:

- Creative thinking
- Design thinking
- Innovative thinking

RESEARCH DESIGN

There has been a lot of research on the virtues of right brain thinking, design thinking, creativity, and Innovation in the context of management and how they could be applied to management education. Changes have been proposed in the management studies curriculum to inculcate these competencies, however, there seems to be a paucity of literature about any empirical evidence of having tested the effect of the changed curriculum on the students. This research was motivated to fill this gap by checking whether the inclusion of subjects that deal with right brain thinking in the management studies curriculum produced a "whole brain thinking manager" or not.

The experiment presented here was conducted by way of incorporating into the management studies curriculum, subjects that would enhance the right brain thinking competencies characterized by creative thinking, design thinking and innovation. The objective of this experiment was to determine if the change in curriculum and pedagogy made a significant change in left and right brain competencies.

NEW MANAGEMENT PROGRAM – 'BUSINES DESIGN'

In Welingkar Institute of Management - a leading Indian business school in Mumbai, a new postgraduate level management curriculum was formulated. It was called the Business Design program[xi] and was based on inclusion of right brain thinking subjects into the curriculum. It focused on facilitating an understanding among the students about the various functions of management instead of dividing them into silos on the basis of "functional specialization". The curriculum was designed to take the students through the entire Business cycle right from identifying needs and opportunities, concept creation, business plan, rollout, valuation, sustenance and exit.

DIFFERENTIATING FACTORS IN THE 'NEW' MANAGEMENT PROGRAM

The Business Design program differed from the conventional management programs in the following ways:

- Curriculum : The Business Design curriculum had a holistic structure and focused on the integration of knowledge from the different streams of study, namely:
    - Management functions – such as Finance, Marketing, Human resources, Operations, Strategy.
    - Social sciences – such as Anthropology, sociology, psychology.
    - Technology – the latest trends in technologies and their potential use in creating new products.
    - Design subjects such as Aesthetics in Business, Interaction design, Information design, ethnography & design research.
    - While the conventional management subjects were expected to build up the left brain competencies, the subjects relating to design and social sciences were expected to enhance the right brain thinking competencies of creativity, design thinking and innovation.
- Pedagogy :
    - Since one of the methods of developing design thinking is through experimentation and prototyping, two laboratories on the Welingkar's campus were established:
        - The "Innowe Lab" – "Innowe" was the name coined for the place where students were encouraged to use the creativity tools and techniques to generate ideas and concepts to solve problems that they would have identified through design research.
        - The "Design workshop" – This facility was equipped with rapid prototyping machines and potters wheel to enable the students to develop a 3-D prototype some of their ideas.
        - This laboratory-supported education was a scientific approach to learning through "experimentation" and "measurement of the consequences". It brings management closer to science with focus on experimentation, rather than opinion or history based discussions. This approach was extended to classroom teaching by simulating the lab experience within the class itself.
    - Experiential learning through Rural Projects – Students were encouraged to take up field projects to explore issues at the grass-root level, requiring them to go and stay in the rural environment for a period of two weeks and use their design research techniques to understand the pain points of the rural residents. This was expected to help them broaden their thought process, since the rural environment was new to most of the students.
    - Hands-on learning through Live Projects: Students were asked to take up 'live challenges' from the industry, and develop solutions using their management, design and innovation competencies.
    - Intergrative thinking- Unlike other management programs which divide the management into , specializations

MEASURES OF SUCCESS

The measure of success of the experiment was chosen as a combination of regular management competencies and the three right brain competencies of Creative, Design and Innovative thinking. In order to test the efficiency of this approach, a group of 60 students were exposed to this Business Design program for a year. This treatment group was compared with a control group of students who were exposed to the conventional management curriculum over the same period of time in the same business school.

QUESTIONNAIRE DESIGN

Data was obtained by administering a questionnaire based on self-assessment of competencies by students of the treatment and control group. The self-assessment model was considered to be

appropriate as propagated by Cooper & Shindler[xii], it is regarded as the best way to assess the parameters of a construct when the privacy of the respondent is to be maintained. It is difficult to assess the actual capability of a person; while he may be capable in the competencies we are looking for, he may not be able to demonstrate the same due to environmental situations.

The questionnaire contained questions sets aimed at testing the following competencies:

- Creative Thinking competencies
- Design thinking competencies
- Innovation competencies
- Managerial competencies
    - Organizational awareness
    - Initiative
    - Adaptability
    - Customer centricity
    - Teamwork
    - Achievement orientation
    - Leadership
    - Decision making
    - Analytical thinking
    - Problem solving
    - Result orientation

The questionnaire was designed on a five point Likert scale, with multiple questions for each competency, since the reliability of a summated, multi-item construct is much higher than a single-item question, as noted by Gliem & Gliem[xiii]. Some of the questions in the questionnaire were reversed so as to capture the casualness displayed by the respondents, if any. Each competency was tested with 5 to 8 questions each, depending upon the expanse of each construct. By 'construct' we mean the set of factors that are identified with a particular competency. This questionnaire was administered to a total of 109 students belonging to both the control and the treatment group.

ESTABLISHING RELIABILITY OF THE QUESTIONNAIRE

Once the data was collected, Cronbach's Alpha Coefficient for Internal Consistency for each of the constructs was calculated. The values of Cronbach's Alpha for each competency are presented in table 1.

Table 1 Values of Cronbach's Alpha for the competencies

S.No.	Competencies	Cronbach Alpha for each competency
1	Strategic thinking	0.8258
2	Organization awareness	0.8217
3	Design thinking	0.8170
4	Customer centric	0.8116
5	Teamwork	0.81
6	Achievement orientation	0.80
7	Leadership	0.7711
8	Adaptability	0.75
9	Result orientation	0.7324
10	Creative thinking	0.70
11	Innovation	0.6753

12	Decision making	0.64
13	Analytical thinking	0.64

Generally in social science research, Cronbach Alpha values above 0.7 are considered good while those between 0.6 and 0.7 are considered acceptable as considered by Gliem & Gliem. Any construct for which the alpha value was found to be lower, were not considered for further analysis, thereby ensuring acceptable reliability of the data for analysis.

DATA ANALYSIS

FINDING CORRELATIONS BETWEEN COMPETENCIES

Correlation between competencies was computed next. Significantly high correlations would indicate the need for regrouping of the constructs through factor analysis. However, correlation between competencies was found to be not significantly high, correlation co-efficient in all cases were below 0.7. The co-efficient of determination, which is the square of the coefficient of correlation, thus works out to be at best 0.49 which implies that half the variation remained unexplained. Therefore it was considered inappropriate to regard the variables as correlated.

The implication of uncorrelated constructs is that the constructs being measured are indeed independent.

ANALYSIS OF VARIANCE – ANOVA

Analysis of variance was used to check if the mean values of the competencies of the control and the treatment group were significantly different. The mean and standard deviation of the two groups for each competency are presented along with the level of significance in table 2.

Table 2 Analysis of Variance between the competencies of the control group & the Treatment group using ANOVA

S.no.	Competencies	Treatment group (Business Design)		Control group (Non – Business Design)		P-value (level of significance of ANOVA)
		Mean	Standard deviation	Mean	Standard deviation	
1	Decision making	3.9108	0.4730	3.8586	0.5657	0.615
2	Analytical Thinking	3.8568	0.4653	3.7771	0.6468	0.465
3	Creative Thinking	4.0965	0.5393	3.7347	0.5141	**0.001**
4	Result Orientation	3.8811	0.5781	3.8686	0.5551	0.915
5	Design thinking	4.3351	0.5298	3.6171	0.6515	**0.000**
6	Organizational Awareness	3.6004	0.5977	3.6367	0.7586	0.787
7	Adaptability	3.8018	0.6596	3.9095	0.7424	0.446
8	Customer Centricity	3.8561	0.5998	3.9371	0.5331	0.497
9	Innovative thinking	3.8568	0.5048	3.7943	0.6834	0.593
10	Leadership	3.6351	0.5927	3.6741	0.6031	0.750
11	Team work	3.8959	0.5008	3.8114	0.6637	0.462
12	Achievement Orientation	3.9240	0.5647	3.7429	0.5490	0.118
13	Strategic thinking	3.7280	0.5915	3.7697	0.5405	0.725

The level of significance (p-value in the table) is the probability of committing Type-I error. A level of significance up to 0.05 (5%)was accepted as denoting a difference between the performance of the treatment and control group for that competency. A level of significance higher

than 0.05 (≥ 5%), was accepted as indicating no difference between the competencies of the treatment and control group.

Sample ANOVA tables showing the analysis of variance in competencies being studied with pictorial representation of the mean and their range are presented below. The symbols used are standard symbols from an ANOVA table.

One-way ANOVA showing analysis of variance in 'Creativity' between Control & Treatment group

Source	DF	SS	MS	F	P
Factor	1	3.111	3.111	11.02	0.001
Error	107	30.214	0.282		
Total	108	33.325			

S = 0.5314 R-Sq = 9.33% R-Sq(adj) = 8.49%

Level	N	Mean	StDev
Treatment grp	74	4.0965	0.5393
Control grp	35	3.7347	0.5141

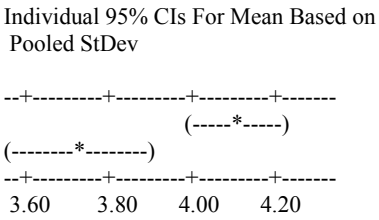


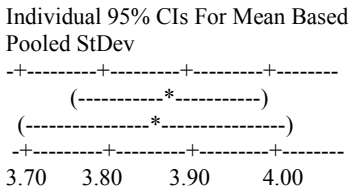
Figure 1 An ANOVA table with pictorial representation of the mean and range of 'Creative thinking' competency measured in the Control & the Treatment group

One-way ANOVA showing analysis of variance in 'Decision making' between Control & Treatment group

Source	DF	SS	MS	F	P
Factor	1	0.065	0.065	0.25	0.615
Error	107	27.214	0.254		
Total	108	27.279			

S = 0.5043 R-Sq = 0.24% R-Sq(adj) = 0.00%

Level	N	Mean	StDev
Treatment grp	74	3.9108	0.4730
Control grp	35	3.8586	0.5657



Pooled StDev = 0.5043

Figure 2 An ANOVA table with pictorial representation of the mean and range of 'Decision Making' competency measured in the Control & the Treatment group

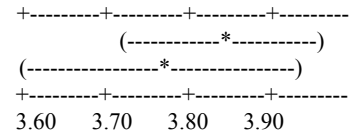
One-way ANOVA showing analysis of variance in 'Analytical Thinking' between Control & Treatment group

Source	DF	SS	MS	F	P
Factor	1	0.151	0.151	0.54	0.465
Error	107	30.023	0.281		
Total	108	30.174			

S = 0.5297 R-Sq = 0.50% R-Sq(adj) = 0.00%

Level	N	Mean	StDev
Treatment grp	74	3.8568	0.4653
Control grp	35	3.7771	0.6468

Individual 95% CIs For Mean Based on Pooled StDev



Pooled StDev = 0.5297

Figure 3 An ANOVA table with pictorial representation of the mean and range of 'Analytical Thinking' competency measured in the Control & the Treatment group

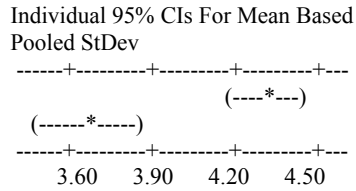
One-way ANOVA showing analysis of variance in 'Design Thinking' between Control & Treatment group

Source	DF	SS	MS	F	P
Factor	1	12.249	12.249	37.54	0.000
Error	107	34.918	0.326		
Total	108	47.168			

S = 0.5713 R-Sq = 25.97% R-Sq(adj) = 25.28%

Level	N	Mean	StDev
Treatment grp	74	4.3351	0.5298
Control grp	35	3.6171	0.6515

Individual 95% CIs For Mean Based on Pooled StDev



Pooled StDev = 0.5713

Figure 4 An ANOVA table with pictorial representation of the mean and range of 'Design Thinking' competency measured in the Control & the Treatment group

FINDINGS AND INTERPRETATION OF RESULTS

1. Commonalties between the Control group and the Treatment group : ANOVA showed that at 5% level of significance, there was no significant difference between the treatment and control groups in the areas of Decision making, Analytical thinking, Result orientation, Organizational awareness, Adaptability, Customer centricity, Leadership, Teamwork, Achievement orientation and Strategic thinking. This implies that the students of the Business Design curriculum (the Treatment group) were as good as the students of the conventional curriculum (the Control group), in terms of left brain thinking competencies traditionally considered to be necessary for a good business manager. It means that the Business Design curriculum does give the spectrum of managerial competencies to the students comparable to any other traditional management program.
2. Differences between the Control group and the Treatment group: The Analysis of Variance between the students of the traditional management curriculum and the Business Design curriculum shows that there is a significant difference in the "Creative thinking" and "Design Thinking" competencies of the two groups under consideration. The Mean values of "Creative thinking" and "Design Thinking" were found to be significantly higher in case of the Treatment group as compared to the Control group, when tested at 5% level of significance.
3. The high value of 'Means' in each competency (Mean value higher than 3.6) indicate that the students of both the groups (Control and Treatment) assert that they have acquired sufficient knowledge in each of the competencies suggesting that both the Conventional Management program and the Business Design program are being conducted successfully and producing the desired results.

CONCLUSION

While both type of competencies i.e. The Left brain thinking and the Right brain thinking, are required for Management functions in today's organizations, it is apparent from this research that there is an opportunity to strengthen the conventional management programs to generate the right brain thinking competencies along with the left brain competencies. In contrast, the Business Design curriculum completes the whole-brain thinking process by generating the "Creative thinking" and "Design thinking" competencies in the students. Thus, the Business Design curriculum lends itself as a superior alternative to the conventional management programs by producing Whole brain thinking Business Managers.

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