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Cristiano Storni, Keelin Leahy, Muireann McMahon, Peter Lloyd y Erik Bohemia.

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Edited by:
Cristiano Storni
Keelin Leahy
Muireann McMahon
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Design Research Society

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Proceedings of DRS 2018

Catalyst

Volume 2

Editors
Cristiano Storni, Keelin Leahy, Muireann McMahon
Peter Lloyd and Erik Bohemia

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Editorial

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DRS2018, hosted by the University of Limerick and the Limerick Institute of Technology is the first international biennial conference of the Design Research Society since the 50th anniversary conference in Brighton. This represented both a challenge and an opportunity; a challenge to meet the high standards set in 2016, but an opportunity to contribute to a growing design research field. The balance between these has translated into the conference theme of *Catalyst*. A catalyst is something that precipitates events; it is the coming together of different entities to generate something new; it is the spark for wider change. Framed by the Catalyst theme, these proceedings explore existing and emergent areas at the intersections of design research, practice, education and policy.

The conference itself built further on innovations from the past two conferences; developing more interactive conversation and debate formats, and providing a forum for practice-based research through the increasingly popular workshops. A *PhD by Design* day, first initiated at DRS2016, provided a platform for PhD researchers to learn new skills, present their work, and network with other researchers. The design of the conference, however, was largely formed around the managed theme tracks which included themes relating to the Special Interest Groups of the DRS. In some cases theme tracks emerged from conversations held at previous conferences, representing a pleasing continuity.

From the initial calls for participation there was a great deal of interest in the conference. Once again we had a truly international range of work presented and published in these proceedings. The original call for theme tracks yielded 46 proposals from which 24 were selected. These formed the backbone of the conference and of these proceedings. The theme tracks represent an increasing engagement with new technologies and data but also reflect contemporary social and political concerns, and the need for different types of design research voices to be heard. In particular, the programme committee were committed to bringing diverse global perspectives into play during the conference.

Following the call for theme tracks, the call for papers resulted in 470 submissions of which, after a rigorous peer-reviewing process, 218 (46%) were finally accepted for presentation and publication. This is a slightly decrease in the acceptance rate from the previous conference indicating a corresponding increase in the quality of the proceedings papers. Although some papers were submitted to an open call, the majority of papers were submitted to theme tracks, with each track being managed through the peer-review process by a track chair and all peer-review overseen by the Programme Committee. In total nearly 1000 paper reviews were written by 330 reviewers. The opportunity for authors to rate and comment on the reviews they received has further helped drive up the quality of peer review for future conferences.

DRS2018 reflects the coming together of many different perspectives and themes. As with previous conferences its design has been emergent, developing over the two years prior to the conference. It has been the result of many discussions and collaborations both within the Limerick team and the DRS more generally. The conference, and the proceedings that have resulted, are an extensive

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collaboration between many people but we would especially like to thank the local organising committee comprising members from the University of Limerick (UL), The Limerick School of Art and Design (LSAD) at the Limerick Institute of Technology, as well as members of other Irish academic institutions all of whom contributed valuable insight and experience. We'd also like to thank the track chairs who worked tirelessly and diligently to organise their tracks, and the reviewers who have ensured the high quality of the papers within those tracks.

Lastly but not least, we need to acknowledge the system that helped shape the way we worked together and made our decisions: the ConfTool conference management system. For the uninitiated ConfTool represents an awkward and mysterious interface. For the initiated it represents an indispensable way to manage the complexity of every stage of the conference process. In a way that echoes the conference theme, ConfTool has been a catalyst for our collective effort in bringing DRS2018 together.

In this sense *Design as a Catalys*t becomes a *thing*; a thing in the Heideggerian sense of a gathering of different entities coming together to deliberate on shared issues and reaffirming the role of DRS as a leading forum for discussing design research from multiple angles. But also a *thing* in the sense of something that escapes a specific definition, reflecting the impossibility and perhaps undesirability of a specific definition of what design research is, and should be.

With this sentiment in mind, we sincerely hope that these proceedings catalyse positive change and that the changes propagate to DRS2020 and beyond.

Go raibh maith agaibh,

Cristiano Storni, Department of Computer Science & Information Systems
Keelin Leahy, School of Education
Muireann Mcmahon, School of Design
Peter Lloyd, Vice Chair of the Design Research Society
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Volume 2

Section 5.

Design, Research and Feminism(s)

DRS 2018 Design Research Society 2018 Catalyst

University of Limerick
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Editorial: Design, Research and Feminism(s)

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As design research matures and interacts more extensively with other academic disciplines, design research communities are engaging more profoundly and reflexively with the nature of research itself and the particular "situated knowledges" (Haraway) of design and the design researcher. Criticality, in design research today, involves interrogation of the theories and methods through which we do research. While early varieties of 'criticality' in design research drew largely from Frankfurt School critical theories, feminist theories are increasingly prevalent as a critical modality in design research by attending to issues such as power, positionality, embodiment, relationality, materiality, territoriality and temporality.

The agency of critical approaches has been of particular concern in contemporary (feminist) critical approaches. Feminist theories assert that things can be different and can extend beyond analytic modalities into practice-based, interventionist and activist modalities to propose, materialize and experience how things may become "otherwise" (Petrescu; Schalk et al; Forlano et al). This opens up further dimensions among design and (feminist) critical theories. For example, exploring how things may become "otherwise" as an approach to design as a "worldmaking" practice may involve (non-) human perspectives on socio-ecological challenges or design work as "making-with" to "stay with trouble" rather than solutions (Haraway; Forlano et al).

With this, our DRS'18 track on the theme 'Design, Research and Feminism(s)' invited contributions exploring notions of criticality and, or, feminism in design research. As part of a feminist practice of "staying with the trouble", this track continues and builds on a conversation at DRS'16 in Brighton, where we catalysed a discussion around our own practices of "making a fuss" as feminists within design research. This theme was inspired by the book by Isabelle Stengers and Vinciane Despret, *Women Who Make a Fuss: The unfaithful daughters of Virginia Woolf,* which discusses changing academia from within. The conversation drew many reflective and propositional contributions from participants.

Interest in the theme has continued in the form of many strong paper submissions to this DRS'18 special track, of which 11 were accepted through double-blind peer review. The papers draw on diverse theories and build on material generated through various methods, but all share efforts to intervene into processes of transformation and "becoming". They explore alternative futures concerning human and non-human bodies; in sites that range from zoo to maker-space; and with objects that range from garments to books and software. The ways of achieving change cover the diversity of activism, education, curating, partnerships with civil society as well as industry.

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Exploration of long-standing, still valid, feminist questions are alive in the papers, articulated in relation to design and research. Authors query forerunners and precedents to raise relevant and pressing questions for our contemporary context including: Who benefits from the design/design research? How is risk distributed? How to organize and how to negotiate the challenges that arise during the processes of designing, researching and distributing the outputs? What bodies are included and excluded in the processes? Who does what labour? Apart from Stengers and Despret, who spurred our first conversation at DRS'16, these authors also turn to and draw upon, for example, intersectional and decolonizing theories, as well as communities of various kinds, thus finding inspiration for alternatives both from within and outside of academia.

The accepted contributions have been divided into two sessions for presentation at the conference. In the first session, the first paper by Mariacristina Sciannamblo, Peter Lyle and Maurizio Teli explores the intersection between participatory design and feminist technoscience, arguing that knowledge-making and world-making practices are inseparable. In the second paper, Pablo Hermansen and Martin Tironi prototype multispecies environments as sites of mutual care, connection and interdependence. In the third paper, Sissel Olander reflects on a practice-based design project, challenging the dichotomies between engagement and analysis, problem-solving and critique, and pragmatism and speculation. In the fourth paper, Nassim JafariNaimi and Anne Pollock use experimental data visualizations that challenge binaries such as matter/meaning, subjectivity/objectivity, and self/other in order to create space for new kinds of feminist design explorations. In the final paper, drawing on third and fourth wave feminism, Sarah Homewood offers a critical feminist reading of menstrual cycle tracking technologies in order to inform the design of technologies that are more affirmative and inclusive.

In the second session, the first paper by Maryam Heidaripour and Laura Forlano explores the ways in which design engages in formgiving to alternative futures that incorporate activism and social justice, drawing on three core dimensions: temporalities, subjectivities and hack-abilities. In the second paper, Sasha Costanza-Chock describes principles of design justice, which focus on the ways in which design reproduces and, simultaneously, can be used to challenge what Black feminist scholars call the matrix of domination. In the third paper, Tanveer Ahmed, argues that bell hook's concept of "love" might allow the field of fashion design to build awareness of experiences of difference and resist stereotyping, appropriation and racist forms of representation. In the fourth paper, Isabel Prochner and Anne Marchand illustrate how a feminist perspective can inform design theory and practice, offering critical and alternative recommendations for the field of industrial design. In the fifth paper, Ramia Mazé argues for a critical and feminist practice of bookmaking that projects, activates and enacts alternative norms of academic work. Finally, Sarah Pennington explores the ways in which feminist notions of care might inform the curation of speculative and critical design.

1 Feminist reframings of design research topics:

- **Fostering Commonfare. Entanglements between Participatory Design and Feminism**

  SCIANNAMBLO Mariacristina; LYLE Peter and TELI Maurizio
- **Prototyping multispecies environments: Attentiveness and friction as modes of knowing**

  HERMANSEN Pablo and TIRONI Martin
- **Critique and post-critique in social innovation projects: between speculation and realism**

  OLANDER, Sissel
- **Heart Sense: Experiments in Design as a Catalyst for Feminist Reflections on Embodiment**

  JAFARINAIMI Nassim; POLLOCK Anne

- **Reframing Design Problems Within Women's Health**

  HOMEWOOD Sarah

2 Feminist reframings of design profession/education categories:

- **Formgiving to Feminist Futures as Design Activism**

  HEIDARIPOUR Maryama; FORLANO Laura

- **Design Justice: towards an intersectional feminist framework for design theory and practice**

  COSTANZA-CHOCK Sasha

- **"All about Love": How would bell hooks teach fashion design?**

  AHMED, Tanveer

- **Learning from Feminist Critiques of and Recommendations for Industrial Design**

  PROCHNER Isabel and MARCHAND Anne

- **Bookmaking as critical and feminist practice of design**

  MAZÉ Ramia

- **Taking care of issues of concern: feminist possibilities and the curation of Speculative and Critical Design**

  PENNINGTON Sarah

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Fostering Commonfare. Entanglements Between Participatory Design and Feminism

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This paper addresses the role of critical theories to knowledge-making and world-making practices in design research. We discuss the agential and performative power of feminist technoscience sensibilities in shaping a European participatory design project – called Commonfare – which aims to confront the risk of social exclusion as a result of precariousness, low income, unemployment, which is increasingly affecting the European population. More specifically, we explore the entanglement of critical approaches and material practices shaping aspects of the project through three empirical examples – related to the formation of the project consortium, the methodological approach adopted by partners, and the organisation of information as part of the design process – that attend to feminist concerns in technoscience and design in that they come to terms with issues of positionality, embodiment, situated knowledges, relationality and materiality. We conclude by arguing that cultivating the inseparability between knowledge-making and world-making practices is a promising and primary concern for any design research committed to fostering alternative futures.

participatory design; feminist technoscience; critical theories; Europe

1 Introduction

The design of digital technologies (DTs) has often drawn upon and intersected a variety of academic disciplines. This includes the fields of human–computer interaction (HCI), computer-supported cooperative work (CSCW), and participatory design (PD). The so-called "three waves" of HCI, for example, were characterized by the intersection of DTs design, cognitive sciences, sociology, organization studies, and social psychology (Bodker, 2006, 2015). This intersection addresses specific themes that have been central in design research around DTs such as: 1) humans as a "factor" to be rationalized and modeled in how they interacted with technologies (Sanders & McCormick, 1987), 2) the "human actor" as a desiring human being immersed in the collaborative environment of the workplace (Bannon, 1991), and 3) humans as the subject of experiences and meaning-making

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interacting with technologies within houses and daily life beyond the workplace (Hassenzahl & Tractinsky, 2006).

Recently, scholars have started developing novel approaches combining elements coming from the "second" and "third" waves, including: enactments and analyses of projects taking place in the public realm (e.g. Huybrecths et al., 2017) and around local communities (Di Salvo et al., 2012); publics organized around thematic issues (Le Dantec, 2016) or new socio-economic subjects like precarious workers and freelancers (Teli, 2015). In these cases, the attention is not exclusively focused on the material object of design, but on the socio-economic aspects of the design process, be they described as public formation (Le Dantec and Di Salvo, 2013) or as contributing to the commons (Teli et al., 2015; Teli et al., 2016). These approaches go beyond specific localities and situations as in traditional PD, for example engaging with institutions (Huybrecths et al., 2017) or advancing counter-capitalist arguments (e.g. Hakken et al., 2016). These developments in design research inevitably interrogate design communities about the critical role of the theories and methods through which we conduct research.

We argue that this diversity of approaches and perspectives is not neutral in shaping the object of design itself along with the design processes, and we ground this argument in the analysis of the activities conducted within a European-funded project called Commonfare. The project is designing and implementing a digital platform to connect people and initiatives across Europe in order to confront societal issues such as new forms of poverty, low income, precariousness, and unemployment. It is a design intervention at the intersection of critical social theories – such as Autonomous Marxism[1] and feminist thinking in technoscience – and recent developments in PD, which make Commonfare an interesting case whereby to reflect upon how such theoretical inspirations shape and benefit design research focused on the relationship between DTs and society.

Our goal is therefore to highlight the entanglement of critical theories and material practices in Commonfare. We begin with a discussion of the performative character of critical theories which will be followed by an overview of feminist thinking in technoscience and design. Empirically, we show and reflect on how these feminist sensibilities are shaping the project. We conclude by arguing that cultivating the inseparability between knowledge-making and world-making practices is a promising and primary concern for any design research committed to fostering alternative futures.

1 The agency of critical theories

To understand the role of critical theories – like feminism – in a design project, we first draw upon social sciences, and Science and Technology Studies (STS) in particular, to interrogate the role of theories and methods through which we do design research (Sciannamblo & Teli, 2017). Theories – be they theoretical concepts or theoretically-argued perspectives and sensibilities – play a key role in sensitizing the vision of researchers and shaping methods, goals, subjects and objects at stake in research projects. John Law and John Urry (2004) have argued a similar approach to design research, suggesting that theories are performative; this means that critical inquiry and its methods are productive in the sense that they help to enact social worlds, rather than to simply describe them. A similar understanding of theories inevitably interrogates research and researchers about what kind of worlds they help to make. It therefore marks out a shift from empiricist realism – the assumption that there is a single reality 'out there' to be described – to ontological multiplicity (Mol, 1999), the understanding that reality is enacted through material-semiotic practices, rather than simply observed. Moreover, if research enacts certain realities rather than others, it should take into

[1] Autonomous Marxism (AM) is a stream of critical thinking that originated in the '70s and that has been highly influential among activists since the late 20th century, which most famous references are probably the books by Michael Hardt and Toni Negri (e.g. 2001, 2005, 2009). AM combines a critique of capitalism with the recognition of the autonomy of people and collectives and the devices through which power reacts to and discipline such autonomy. For a reading of AM in the field of IT design, see also Teli (2015). The relations between AM and feminism are rich and evolved over time but, for sake of simplicity, in this paper we will focus only on feminism.

account the realities it contributes to building. This is, in fact, a matter of "ontological politics" (Mol, 1999) insofar as it calls into question the political and ethical character of social theories and methods.

Such an understanding of social research is close to what Law (2009) has defined as 'interference': the act of making differences by means of descriptions and knowing practices. According to Law, feminist STS – such the seminal thinking of Donna Haraway, but also the work of Susan Leigh Star and Lucy Suchman – has challenged the absence of politics in mainstream studies of science and technology by showing the extent to which making knowledge means making difference, that is interfering with the object of the study. This is even truer for design research, whose goal is not only that of generating knowledge around sociotechnical issues, but also creating artifacts that are never innocent since they imply certain configurations of subjects, objects, practices, and power (Lindström & Ståhl, 2014). In this respect, a design practice that aims to address societal issues with the lens of feminist thinking cannot avoid setting up its actions around the "*cui bono*" question (Star, 1990), that is to critically assess where to begin and where to be based, as well as to ask: What and who is this built for? Whose voices and visions does it comprise? Who is left out? Could it have been otherwise?

2 Feminist technoscience confronts design

The above questions underline the major feminist concerns in technoscience and design, namely how to enact silence (Star and Strauss, 1999), give voice and representation to the traditionally invisible (Star, 1990), interrogate boundaries (Suchman, 2007), and highlight local and marginal positions (Haraway, 1988; Suchman, 2002). Indeed, addressing the irreducibility of lived practice, exploring new accountabilities and forms of agencies, enacting silence and invisibility behind the design and use of sociotechnical systems serve to trouble those boundaries and binary divisions (such as sex/gender, masculine/feminine, nature/culture, hardware/software, science/technology) around which science and technology has been – and is – regulated.

In recent years, several works located at the intersection of design, gender, and feminist analysis have taken up feminist concerns in STS, with a specific focus on computing and ICT (Trauth, 2006; Oudshoorn et al., 2004; Rommes et al. 2012). This is a strand of literature that mostly intersects the heterogeneous configuration of gender and feminist studies in technoscience (Schiebinger, 2003; Wajcman, 1991, 2010; Faulkner 2001), which, in turn, follow the waves whereby the feminist movement has unfolded historically. The themes covered by these studies range in fact from the most visible problem – such as the shortage of women in the ICT industry and the gendered division of labor in the design sector – to the more subtle investigation of gender bias in design methodology and the co-construction of gender and technology (Bath, 2009; Oudshoorn et al., 2004; Rommes et al. 2012). More recently, design-related fields such as interaction design, PD, HCI and CSCW have shown a meaningful interest in feminist research and thinking, not only to provide critical analyses of design processes, but also to develop specific design interventions and engage in activist research with a feminist perspective (Bardzell, 2010; Lindström & Ståhl, 2014; Steinhardt et al., 2016; Fox et al. 2017). Bardzell (2010), for example, has outlined a feminist agenda for HCI research by proposing a "constellation of qualities" (pluralism, participation, advocacy, ecology, embodiment, and self-disclosure) that – taken together – characterize feminist HCI. She distinguishes two ways whereby feminism contributes to DT design: critique-based and generative. The critique-based approach draws more directly from fields such as STS in that it focuses on the investigation of design processes in order to unveil their unintended consequences and argue for a stronger attention to critical issues, while the generative approach comprises design projects that take up feminist concerns in their own analytical framework, decision-making practices, design processes, and political goals. Interesting examples related to the critique-based approach include analyses of how technology design disciplines bodies and everyday activities (Forlano, 2016), gender identities (Oudshoorn et al., 2004), sexual orientations (Hardy and Lindtner, 2017), and how ICT technologies are informed by

colonialist epistemologies (Philip et al., 2010). For the generative approach, design projects that can be considered as interventions are those that aim to build technology to support activist movements and emancipatory claims (Dimond et al., 2013), technology for social good (Grimes et al., 2008), and design committed to advancing non-market values (Irani and Silberman, 2013).

One of the main tenets of feminist technoscience, however, lies on the inseparability of knowledge-making and world-making (Barad 2007; Haraway, 2013), such that there is not a clear distinction between analytical practices and interventions in the world we live in. Following this understanding, critique-based and generative practices are always entangled, so that there is not a clear divide between them. Feminist physicist Karen Barad has introduced the concept of 'entanglement' to describe such inseparability between matter and meaning, knowledge and materiality: "to be entangled is not simply to be intertwined with another, as in the joining of separate entities, but to lack an independent, self-contained existence" (Barad, 2007: p. ix). She further explains claiming that "the point is not merely that knowledge practices have material consequences but that practices of knowing are specific material engagements that participate in (re)configuring the world" (Barad, 2007: 90). This serves as an important reminder for every knowledge enterprise, but perhaps especially for those transdisciplinary fields such as PD and co-design that are explicitly driven by democratic and emancipatory aims, and that in recent years have moved beyond their context of birth – the workplace – to engage societal challenges and large-scale public projects (Binder et al., 2015).

Considering this entanglement between knowledge-making and world-making practices, it becomes pivotal to constantly interrogate the theories and methods through which we shape research practices so as to be able to not lose sight of the political aims PD projects seek to pursue, and to recognize and stay with the complexities such effort entails. In what follows, we delineate the configuration of the project and the design work it seeks to pursue, discussing how feminist and critical theories have shaped and are shaping the composition of its collectives, its main goals, and the design practices underway. In doing so we aim to offer a contribution to the ongoing debate about design and feminist critical theories.

3 The Commonfare project

The primacy of relations – rather than of independent objects and entities – conveyed by the concept of 'entanglement' is at the heart of Commonfare (General Intellect, 2018), as is evident its very name: Commonfare literally means "being in common" and "to journey together" (different from welfare, which literally means "being good"). Commonfare describes in fact both the name of a European PD project and its ultimate goal: the advancement of Commonfare as a new form of welfare based on the valorization and remuneration of social cooperation as practiced by grassroots initiatives and communities committed to re-appropriating common goods (Fumagalli & Lucarelli, 2015).

As for its configuration, the project aims to design a digital platform with the purpose to connect people and initiatives across Europe in order to confront precariousness. It articulates its actions in three European countries (Croatia, Italy, The Netherlands), focusing on different populations considered at risk of material deprivation or social exclusion, including: unemployed youth, precarious workers, non-Western migrants, welfare recipients, and freelancers. Across Europe there are social groups particularly at risk of social exclusion, identified by the European Commission (EC) as "women, young people, people living in single-parent households, lower educated people and migrants." (Eurostat, 2015). This finding aligns with those analyses that underline the intersectional character of precarious lives, pointing out that the consequences of neoliberal policies do not affect social groups in equal measure and that specific groups of people are, and may become, more socially vulnerable than others (Lewis et al., 2014; Maestripieri, 2015).

Against this backdrop, Commonfare aims to build a digital platform – commonfare.net – with the following goals: 1) to inform about public welfare measures, 2) to share good practices on coping

with critical conditions, and 3) to support networking activities able to bring use-value (or income) to people's everyday life.

The project's consortium is interdisciplinary, involving eight partner organizations: research organizations that contribute different social and technical experience, technical organizations that support the design and development of the platform, and pilot organizations whose experience and expertise include political activism, research and art. The articulation of work runs in parallel between research in the pilot sites (Croatia, Italy, The Netherlands) and design work, and it is planned and reported in documents and physical meetings to later shape the technical decisions and be reflectively evaluated by the consortium. This process is depicted in Figure 1, (Botto & Teli, 2017), and the most relevant physical meetings are the ones described as "Workshop 1-4".

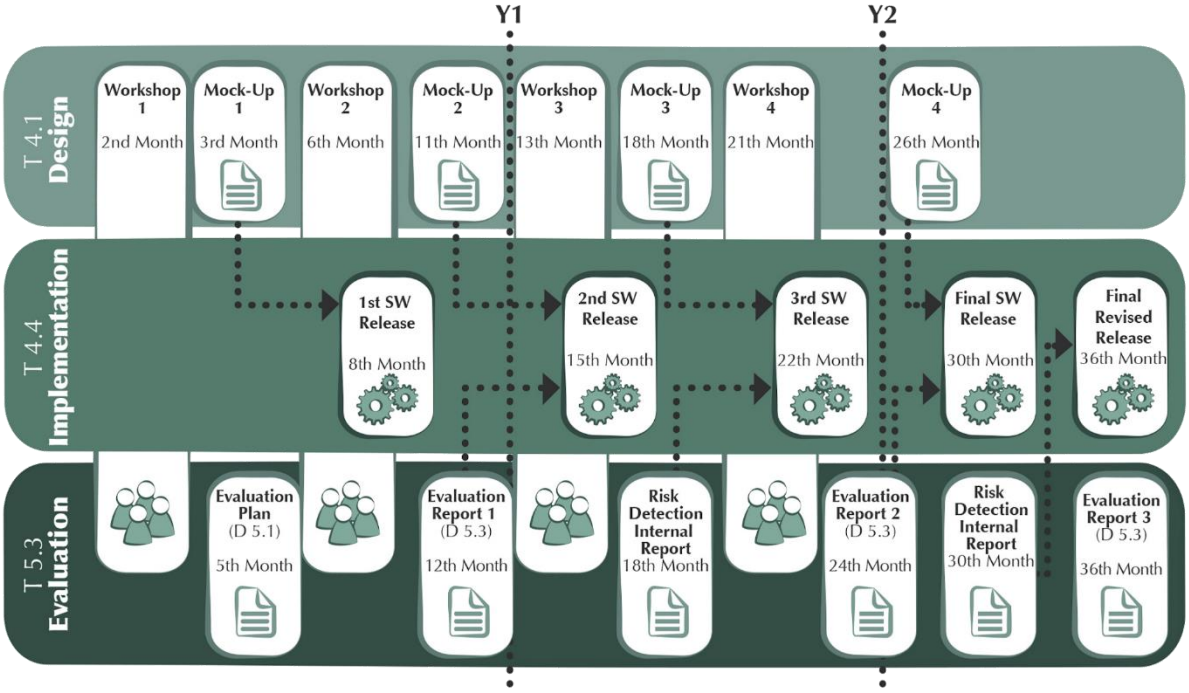

Figure 1 Commonfare design and implementation approach

In gender terms, the consortium is composed of 22 core members (homogeneously distributed between 10 men and 12 women) working on coordination, pilot, research, design, and communication activities. It is important to note that some people employed in the project – especially the youngest – recognize themselves in the conditions the project seeks to address due to temporary contracts and bureaucratic regulations (regarding remuneration and claimable expenses in relation to the recognition of prior economic activity).

4 Commonfare in the making

Here we illustrate two main aspects of the project: the configuration of the project's consortium and the design work. Three empirical examples are discussed in the light of the agential character of critical theories and the role of feminist approaches in knowledge-making and world-making in design research. The overarching research question addressed by these examples is: how is the entanglement of critical theories and material practices shaping the project?

The examples draw on empirical sources categorized as external and internal documents. The former comprises the project grant agreement, project official reports, informational materials (fact-sheets, press releases, project flyers), and the digital platform; the latter consists of design workshop accounts (from activities conducted with research participants), minutes of general assemblies (whole consortium), reports from focus group self-evaluation (conducted with

consortium partners), design workshop plans (among consortium partners), low and high fidelity mock-ups and personal accounts.

4.1 Building alliances

Projects like Commonfare require, as part of their institutional setting and due to the complexity of the goals, to establish consortia including different organizations with complementary skills and competences, to take on different roles as the project unfolds. The way consortia are established is often overlooked in academic writing as it often does not reflect theoretical elaborations. In this section, we will describe how the Commonfare consortium came into being through the first person account of Maurizio, who lead the collaborative writing of the project proposal and, before that, the formation of the consortium itself. We report this personal (therefore partial) account because the process of formation of the consortium is a first example of entanglement between critical theories and PD practices.

> ***Trento, Italy, 2014****. I enjoy talking to Silvia about her research on social policy and anti-poverty measures. The way policy makers deal with people in difficulties, treating them as object of policy actions more than living human beings with desires and capacities, in many ways disturbs us. How can I do something different? Is there any potential, in my work on digital technologies, social collaboration, and participatory design, to actually engage in building alternatives to the assumptions connected with so many social policy debates?*
>
> *I need a theoretical shift, Actor-Network Theory is not going to provide me the means to discuss such themes appropriately, there is too much focus on reconstructing the processes of knowledge and technology production rather than on how it is possible to build viable alternatives. Even my work on Free and Open Source software is insufficient, as the relation with income and social inequalities is hidden in Free and Open Source studies and, in the end, many of these software projects involve mainly highly skilled males - not the social groups Silvia describes to me. And Participatory Design… it seems its roots have drifted, much less politics than there should be…*
>
> *I enjoyed reading Hardt and Negri (2009), they present compelling theoretical and political angles, and I loved Morini and Fumagalli's "life theory of value" (2010) - through their lens I see my previous work completely differently. I should read more on the proposal for an unconditional basic income they are all endorsing, it reverses the patronizing argument of many social policies.*
>
> ***Trento, Italy, later on 2014****. Francesco and Stefano have approached me for a CAPS[2] proposal, maybe it's the chance to look forward for a project on income and inequalities. I am sure they will be committed: many times I have worked with Stefano before, his problematization of reputation systems is extremely promising, it can help go beyond some of the individualized assumptions of contemporary platforms; Francesco was a leading figure during the Ph.D., we have never worked together but he is clearly trying to expand the boundaries of his work beyond engineering projects. They both have experience and know-how about proposal writing, we can actually get something done, I can try leading this one, we still have almost a year to go. I want to work with activists, I need to do it, to get out of academic constrictions and banality, I should find a way to build the condition to make a difference beyond improving my publication record. I should try with the Basic Income Network, if they would like to do something, I feel it can really work.*

[2] CAPS – Collective Awareness Platforms for Sustainability and Social Innovation – is the European funding line in which the Commonfare project is included.

***Milano, Italy, even later on 2014**. I have spoken with Antonella, she is fine with me leading the writing process, her support is important, and she will certainly help shaping a better proposal. Today I have met Andrea Fumagalli in Linate airport, via email he seemed very open to collaborate on this and the face to face meeting confirmed the feeling: Basic Income Network Italy is in. He also mentioned potential Croatian partners - I am curious to work with Eastern Europeans, their history brought to social conditions that I don't really know about. I have never imagined that the burden of a long-distance relationship, now that Silvia lives in Belgium, could bring to such good meetings at the airport.*

***Bloomington, Indiana, December 2014**. We have started writing the proposal. Since talking to Andrea, I met Jaromil from Dyne.org and I proposed them to join the project. Experienced, committed, politically clear – the impression was great – and Marco, the person collaborating in the writing, looks like a great person to get along with. Jaromil suggested Museu da Crise, a socially and politically engaged art project trying to turn the economic and financial troubles of Europe into something of the past, and I have spoken to MAGIS, they have a great track record on CAPS proposals - I am excited about the interdisciplinary nature of the consortium, the vibes are great. In the meantime, I am drowning, as usual, revising the "public design" paper for IJHCS (Teli et al., 2015) and here with David and Barbara to finish the book (Hakken et al., 2016). My body is at the crossroad of all these stimuli, and I am happy.*

***Trento, Italy, Spring 2016**. The project has been approved, but we can't keep MAGIS in the consortium anymore - their problems with the EC are too serious. Finalizing the grant is frustrating - nothing like the commitment and excitement in writing the proposal - we should have already started, I hope we will start before the summer… and I also have to plan my moving to Madeira, what a mess! Fortunately Chiara is interested in working on this project from Trento… things will work out at the end.*

Since the approval of the project proposal, all partners actively contributed to shape the grant signed with the EC as well as the activities concerning the research work and processes of decision-making, which are the focus of the next section.

4.2 Interorganizational Relationships

Since the inception of organizational and research activities, the Commonfare consortium began to work following a deliberative and collegial approach at each step and for each issue concerning the project. Indeed, where the grant agreement prescribes all the conditions of the project (reports, deadlines, rights and obligations of the parties), the actual research methodology in the three pilot countries, as well as any process of decision-making regarding the design of the platform, have been agreed collectively either within the whole consortium or within work packages. This process extends even to relatively minor tasks – e.g. creating the first project newsletter – which are also shared with the whole consortium for reasons of notification and to allow for general feedback.

An interesting case that illustrates the collegial research methodology driving research activities concerns the realization of the socio-economic research by pilot organizations to understand the emerging priorities of people in precarious conditions. This applies in terms of their social needs as well as to identify the individual, collective, common and grassroots positive responses to these needs (BIN Italia et al., 2017). Notwithstanding the differences between the three countries in terms of the population involved and the socioeconomic conditions, the pilot organizations developed a common methodological strategy based on qualitative investigation to be adopted in a flexible way within local contexts. This methodological device consisted of a questionnaire – to collect basic information about participants such as gender, working and financial condition, housing situation, access to local services – and a focus group; the latter served to discuss in depth the issues raised in the questionnaires so that to access various aspects of individual and collective life stories. As the official reports claims, "the circular group discussion, more effective than a top down approach used

in interviews, has encouraged the creation of a space where the narrative of individual experiences was connected to a critical reflection on the general condition" (BIN Italia et al., 2017, p. 47).

The main goal behind such common methodological choice was that of building engagement and relationships of trust with individuals and groups constituted by or representing the population of interest in Croatia, Italy and The Netherlands, which has proven a complex task as participants made it clear their distrust towards institutions, and the EU in particular.

These difficulties have engaged pilot partners in a careful process of self-reflexivity with the whole consortium. During two self-evaluation focus groups organized thus far and involving the entire consortium, pilot partners made clear their troubles in approaching people who have experienced a traumatic events such as migrants who experienced conflicts and people who faced racism; this collegial reflection also served to discuss the importance and, at the same time, the challenge of undertaking caring and time-consuming activities (such as having coffee and tea with people in public bars) in order to reach out to potential research participants. These concerns respond to a genuine interest in collecting as many voices and visions as possible in order to elaborate design requirements with the people in the field that constitute Commonfare research participants. It should be noted how this approach is not only referring to research participants as informants, *à là* user-centered design, but it is indeed embedding the design activities in the practices and politics of the involved participants, in the tradition of PD.

4.3 Bits and pieces of the design process

Here we introduce an example that focuses on enacting the design process, toward the digital platform. The example draws on the work undertaken to build an understanding of the different existing welfare state measures in the pilot countries, and to categorize them on the platform in a way that reflects the field research carried out by pilot organizations. As anticipated in Figure 1, one of the key elements in the design of commonfare.net is represented by design workshops, in which the whole consortium, together with research participants in the pilot locations, discussed and summarized the previous work and work to be done in the following months. As PD workshops, these moments have been characterized by highly interactive, collective sessions of knowledge creation and consolidation, drawing upon a multiplicity of design techniques, like counterfactual scripting (Huybrechts et al., 2017), collaborative mapping, and moments of self-reflexivity.

It is interesting to describe how the work unfolded between two design workshops held in Croatia (September 2016 and January 2017), as during this period the early analytical categorization of existing welfare provisions was challenged and changed by the inclusion of the participants' perspectives. Both workshops were oriented toward building the basic concepts and ideas for the design of commonfare.net as a digital artefact, as well as the public engagement strategies of the project by following a public formation approach that considers the object of design and public engagement as intertwined and taking place at the same time. To achieve such goals, the linchpin of any process of decision-making has been the findings of the social research and participative design workshops that pilot organizations have undertaken so that to trace out the social and institutional conditions of the people experiencing precarious conditions as well as their responses to them.

Here we focus on one of the outcomes of these activities, namely the categorization of existing welfare state provisions to be displayed in what would later become the first release of commonfare.net (henceforth, R1), intended as a read-only website allowing people to get clear information on available welfare state provisions in their respective countries. The backend of such categorization was research conducted by pilot organizations, which collected existing welfare state provisions through a specific working document that later converged in the research report submitted to the EC in February 2017 (BIN Italia et al., 2017), which provided a first categorization of welfare state provisions consisting of four main categories. The welfare provisions that were collected in such a way constituted the first informational base to be displayed in R1.

Between the two Croatian design workshops mentioned above, the team responsible for design and implementation worked on the basis of the results of the first workshop – as well as the research conducted by pilot partners – to produce mock-ups. These mock-ups were shared with the consortium and another group of Croatian participants, during the second design workshop. The input from participants related to aesthetic aspects of the mock-ups and on the categorization itself, where participants identified issues of detached and general classification language. The input resulted in splitting two of the categories (for a total of six), and changing the language toward something closer to the lived experience of people (e.g. from "culture" to "cultural events"). Figures 2-3 represent what was shared (left) and what was actually implemented (right).

Figure 2 early mock-up shown to the participants

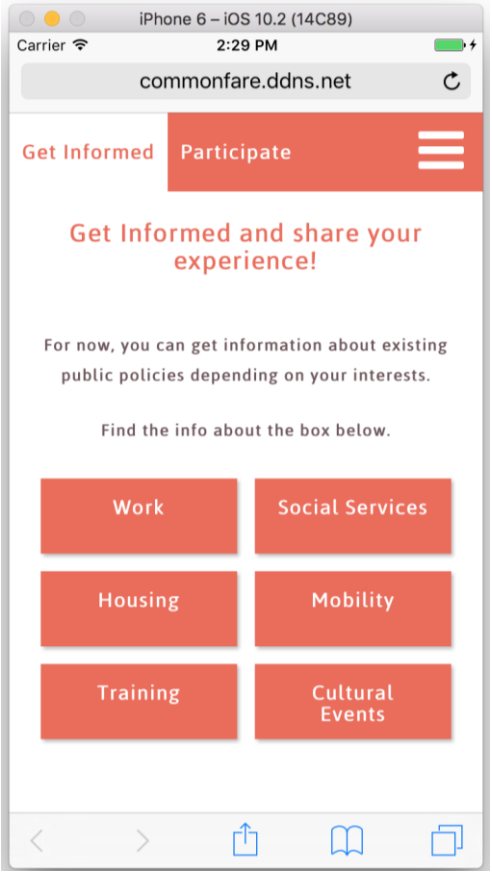

Figure 3 final mock-up implemented

5 Discussion and conclusion

In discussing the multiple relations that characterize knowing and research practices, Barad (2007) provides nuanced definitions of 'entanglement', pointing towards a set of connections and responsibilities that intersect matters of being, knowing, and doing, through ontology, epistemology, and ethics. We see this throughout the empirical examples: 1) in the case of the personal account of the consortium and project's establishment, in which entanglements are visible in the process of building up networks of actors with overlapping theoretical positions in parallel to their understanding of how Commonfare could be shaped; 2) in the collaborative methodology part of PD, in which entanglements are visible through the recurrent moments of self-reflexivity undertaken within the whole consortium; and, 3) in the interactions between consortium and pilot country participants, in which entanglements unfold as part of the design process to align the different understanding of needs for the organisation of welfare information. These empirical cases attend to feminist concerns in technoscience and design with respect to issues of positionality, embodiment, situated knowledges, relationality and materiality.

The first example presents Maurizio's account reconstructing the genealogy of the project as a personal, professional and political path. Indeed, in recalling the initial concept of the project, he recounts how the idea to combine its primary research interests – PD and sociology – with social and political issues derived from the private and constant exchange with his partner, Silvia. Thanks to this relation and further intellectual explorations, he came closer to AM perspectives, which helped him to develop a stronger political position focused on the life condition of people. Such early personal, disciplinary, and political encounters reflect the following phases of the construction of alliances that, eventually, resulted in the formation of the Commonfare consortium.

Following Brit Ross Winthereik and Helen Verran (2012), this reconstruction can be considered an ethnographic story, namely an experience-based account that it is "*generative* for the people and practices that the stories are about". In mobilizing the notions of 'partiality' and 'double vision' by Strathern and and Haraway respectively, Winthereik and Verran seek to call into question the dualism between a traditional academic perspective that regards research as non-interventionist and its opposite, namely the engaged and interventionist research. The concepts of partial perspective and double vision suggest that the stories we write "are generative for *some of* the practices we study and for *some of* our own colleagues in social theory" (Winthereik & Verran, 2012, p. 38, emphasis in the original), and that other stories are possible. Such an account can be considered a form of embodied and situated knowledge in that it is "about nodes in fields, inflections in orientations, and responsibility for difference in material-semiotic fields of meaning" (Haraway, 1988: 588); the narration of Maurizio's path points out precisely this process of making nodes among people, fields of research, and locations that present a clear political orientation, and are committed to make a difference in the world. In being clearly positioned, situated and, therefore, partial, the account on the origins of the project does not provide a view "from nowhere" or "from above", but rather is based on people's lives and encounters, on which basis it makes rational knowledge claims. As a form of entanglement, we see in Maurizio's experience how his embodied and situated position has shaped the project by mixing theoretical, methodological, disciplinary, and ethical/political elements while including different voices, those of the consortium members, in a way that would have been impossible without the project idea itself. The project and Maurizio's personal commitment to it are, therefore, both the result of such entanglements and the condition of their existence.

The second empirical example is situated some time after the events narrated in the first one, and it describes the participatory research methodology whereby pilot partners conducted their research in the field as well as the need of moments of self-reflexivity in which they found themselves during design workshops. Indeed, such request of collegial reflection responds to their troubles in dealing with people who experienced traumatic events, but it also served to highlight the importance and, at the same time, the challenge of undertaking caring and time-consuming activities (such as having coffee and tea with people in public bars) in order to approach potential research participants. In these preoccupations, as well in their reluctance to make any design decision without the support of evidence from the field – that is, without involving people in the decision-making process – , we read an inclination towards problematizing issues of exclusion and invisibility and a genuine interest in including research participants' visions and voices within the design process. These concerns, therefore, align with the major feminist issues in technoscience and design, that is how to enact silence (Star and Strauss, 1999), give voice and representation to the traditionally invisible (Star, 1990), and to highlight local and marginal positions (Suchman, 2002). The project methodology, PD, is therefore another element through which entanglements come into being, as researching and making the world are crucial parts of the process itself.

The third empirical example can be seen as an early design intervention undertaken in order to attend participants' inputs. As a matter of fact, if the first categorization of welfare state provisions, made up of four categories was the outcome of the collective research by pilot organizations about their respective countries, the second categorization is the result of the feedback and comments

provided by Croatian participants, who highlighted a need to split two of the categories and to create, accordingly, six categories. This third example reveals another concern that feminist STS brings forward: the configuration and reconfiguration of boundaries between material and discursive practices as well as agencies within networks of people and things. As Suchman (2009) explains, such feminist reconfigurations of the human-machine interface point out the fact that the ongoing design work is undertaken by actors rarely recognized as designers, rather than by the usual male inventors located in developments labs. This is a crucial acknowledgement for any PD projects such as Commonfare insofar it framed technology design as an open site in which the capacity for action, which is relational, dynamic, diverse and collective, takes place and can be supported. In this case, it is the material practice of designing and discussing the design with participants that entangle with the theoretical perspective proposed by the project consortium. The materialization of this theoretical perspective in mock-ups for discussion is one of the ways through which theory and material practices are entangled, as the discussion and the request for change would not have been possible without it.

These three examples describe how the agential character of feminist sensibilities have shaped – and are shaping – a European PD project that grapples with important social issues. The participatory methodology, goals, collectives and political views that characterize Commonfare constitute a specific configuration of humans, non-humans, technical and critical practices rooted in the belief that theories and methods do not simply describe worlds, but they help to create them, and so it becomes important to interrogate how things may become otherwise (Star, 1990; Forlano et al., 2016). Commonfare.net, therefore, is envisioned as a site of political potential that openly challenges the extractive models of contemporary digital platforms, supporting people to express their desires, share knowledge and counter-narratives, and to co-construct opportunities for change.

Against this backdrop, feminist sensibilities play a key role in shaping the project, helping to identify allies and construct heterogeneous collectives, to develop methodological tools in a collaborative way, to foster recurrent moments of self-reflexivity, and to make design interventions based on the concern of attending those voices and experiences detected through field research. As we have discussed in this paper, the entanglement of critical theories and material practices that feminist technoscience emphasizes is grounded in the situated position of individuals, the methodological choice of collective self-reflexivity, and the material artefacts that populate a design process. Cultivating such inseparability between knowledge-making and world-making practices is a promising and a primary concern for any design research committed to fostering alternative futures.

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Prototyping Multispecies Environments: attentiveness and friction as modes of knowing

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This article is based on the process of prototyping an environmental enrichment device for gibbons at the National Zoo of Chile (ZNdC). We analyse the capacity of prototyping to make the ontological qualities of the entities involved perceptible while precipitating forms of care and connection. We will show that the very process of prototyping favours the mise en scène of an interspecies environment, sheltering the delicate unfolding of an 'us' that is based on mutual care and attention. We argue that this unfolding transforms prototyping into a cosmopolitical place for exercising modes of correspondence between humans, non-humans and environments. In an effort to understand prototyping as a scenario in which to perform our species interdependence, we propose a conversation between different concepts around the ideas of cosmopolitics and correspondence in order to encourage reflections on design practices that are sensitive to those entangled 'beyond the human.'

prototyping, species interdependence, cosmopolitics, care, correspondence

1 Introduction

The current ecological crisis and perception of ontological uncertainty, have generated renewed interest in studying the multiple modes of existence that compose our 'collective' as well as the continuities or discontinuities established between humans and non-humans (Descola, 2005; Haraway, 2008; Ingold, 1988; Latour, 2007; Stengers, 2010). This concern, which is generally described as an 'ontological turn,' has generated a busy agenda in both theoretical and methodological terms that is aimed at rethinking the analytical repertoires necessary to incorporate the non-expected agency of more-than-human entities into analyses of our social worlds.

Concepts such as *cosmopolitics* (Stengers, 1997, 2005, 2010, 2013), *the parliament of things* (Latour, 2005), *hybrid assemblages* (Callon, 2008; Callon & Rip, 1992; Lestel, 2004), *correspondence* (Ingold, 2017), *companion species* (Haraway, 2008), *precariousness* (Butler 2016) and *multi-species ethnography* (Kirksey & Helmreich, 2010; Kohn, 2007) reflect just some of the efforts that have been made to move beyond the modern anthropocentrism that has prevailed in social research.

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In spite of the importance of the ecological considerations posed by what is called the 'ontological turn', we find few works focused on the epistemological challenges imposed by ontological multiplicity on design practices (Binder, Brandt, Ehn, & Halse, 2015; Jönsson & Lenskjold, 2014, 2017). Efforts in this area share a desire to explore experimental tools for extending the condition of subjects to non-human entities (Binder et al., 2015) or to understanding how non-human entities participate in the design process (Rice, 2017).

Our contribution to this discussion is based on the process of designing and prototyping an environmental enrichment device for gibbons at the National Zoo of Chile (ZNdC) in the context of the Interaction Design Workshop offered by the Pontificia Universidad Católica de Chile School of Design (TDI-UC). We argue that given the challenges that this ontological turn "beyond the human" poses, design must challenge the prevailing anthropocentrism present in its own modes of producing knowledge and materializing it. We believe that by distancing ourselves from dualist anthropocentrism (Bennett, 2010), we approach more careful, situated forms of conceiving of the project. As Bennet suggests, "the ethical task is to cultivate ability to discern nonhuman vitality, to become open to it" (2010:14).

In this regard, this article describes the qualities of the prototyping process in terms of allowing for an ethics of care between agencies that interact. Specifically, we analyse a design process that weaves together animals, students, zookeepers, docents and environments. While the case study will be conducted using different conceptual figures, we propose a conversation between two main concepts: cosmopolitics (Stengers, 2005; Latour, 2007) and correspondence (Ingold, 2017).

As we have discussed in earlier studies (Hermansen and Tironi, 2018; Tironi and Hermansen, 2018; Tironi, Hermansen and Neira, 2014), the cosmopolitical purpose of producing a notion of politics that is permeable to more than human affectivity is a practical challenge which cannot be confined to the philosophical domain. In other words, cosmopolitics can also be conceived of as a *matter of design*, understood as a space of experimentation for ways of articulating the multiple, and 'drawing things together' (Binder et al., 2015; Li Jönsson, 2014). As such, prototyping and designing with non-human entities allows us to glimpse spaces of correspondence in which beings respond to one another in a gesture of care and attentionality rather than intentionality (Ingold, 2017).

This article demonstrates the ability of prototyping to slow down (Stengers, 2010) the assumptions of user-centred and problem-solving design, opening up design to ever-emerging, precarious forms of action in which to play. Following Donna Haraway, interspecies prototyping becomes a "worlding game (...) of response and respect" (Haraway, 2008, p. 19). We offer an empirical analysis of how the identities and positions evoked in the process of prototyping are no longer conceived of as given facts to be assumed as the result of the processes of friction and care, ambiguity and correspondence.

2 Cosmopolitical uncertainty

While cosmopolitanism postulates an exercise of world politics that is positive, normative and controlled by humans of a certain profile, Stengers' cosmopolitics (2005) stands at the antipodes of this approach: it resists matters of fact and good reasons, questions laws and hegemonic consensus. Going beyond diversity, it celebrates the incommensurability and recalcitrance of the multiple ontologies that inhabit the world. Unlike the Habermasian public sphere (1991), a figure inherited from cosmopolitanism in which the protagonist is a lettered, humanist and rational citizen, ready to build consensus through dialogical practice, what prevails in the cosmopolitical meshwork are the disputes, the possibilities of dissent and agonism. In the words of Stengers, in cosmopolitics, the protagonist is "Deleuze's idiot, borrowed from Dostoevsky and turned into a conceptual character, is the one who always slows the others down, who resists the consensual way in which the situation is presented and in which emergencies mobilize thought or action" (Stengers, 2005, p. 994).

The turn from the enlightened humanist to the cosmopolitical idiot is a radical one. Specifically, it entails "making a move against the current that leads to the loss of self, which Sloterdijk calls 're-volutionary,' Plato, 'periagogé,' St. Augustine, 'conversio' and Heidegger, 'Kehre,' a movement whose meaning is to direct itself, through it, towards the truth of being" (Cordua, 2008, p. 72). The turn towards the idiotic, which we could paraphrase as *the truth of being-here*, is for Stengers constitutive of the cosmopolitical experience, committing and encouraging us to exercise idiocy and to incorporate the idiotic manifestations of others.

The importance of the idiot in times of ecological crisis is that he refuses to understand good reasons or to be persuaded by the agreements that underlie the daily practices that have led us to the doors of the debacle (Stengers 2005). To refuse is a "move against the current," a form of resistance that, without arguments or agendas, forces those around the idiot to modify their forms of exchange and socialization, deploying what Tsing calls the art of noticing (2011). The idiot has no hidden interests or good reasons to resist. He is not claiming a cause or attempting to antagonise another. Without heroism, from his truth of being-here, he imposes his inertia through the weight of his recalcitrance, managing to slow down the course of things.

When we find that multiplicity and incommensurability is a common condition of the world, it becomes necessary to challenge anthropocentric and patriarchal approaches to apprehend the world, describing the ways in which non-human beings are affecting others and being affected by them. The cosmopolitical exercise thus invites us to conceive of concrete spaces in which entities such as mammals, volcanoes, software or microbes can exercise new forms of 'citizenship.' This cosmopolitical interpelation compels us to participate in incommensurable worlds, to recognize the frictions and precarities of the entities at play (De la Cadena, 2015). It not only rejects the Habermasian consensus, but also is a call to carefully consider the heterogeneity of the cosmos[1] and the affective forms of more-than-human correspondence. Following Ingod (2016), correspondence does not imply ontological symmetry, homogeneity or unification, but rather sympathy and attentiveness, a recognition of the irreducible, in short, a sensitive attitude. It is in this sense that we believe that Tim Ingold's notion of correspondence (2016) -as the meaningfully capacity of attending and responding to the trajectories of all entities (2016:22) or the capacity of being affected and being able to affect (Despret, 2004:114)- connects with the cosmopolitical invitation to recognize that our social worlds cannot be reduced to the consensus "between humans." The notion of correspondence thus shares one of the main cosmopolitical concerns, namely, carefully considering the doubts, resistance and questions presented by more than human entities.

3 Prototyping modes of correspondence

How can we represent the beings bound in correspondence? How can we learn to generate knowledge through mutual caring that is sensitive to differences and open to failures and precariousness? What role could design play in this set of entanglements and correspondences?

Contrary to the grandiloquence of concepts such as "construction" or "fabrication" typical of the "Promethean" logic of modernity, Bruno Latour (2008) postulates that design contains a gesture of humility, an ethics of care and attention to the specific. This feature is intimately linked to the role of the craftsman mentioned by Ingold (2013) and its ability to be affected by the vitality of things rather than by the deductivism of abstract knowledge production. It is precisely this ethos which finds itself positioned against the idea of the foundational progress of modern rationality, which leads Latour (2008) to speak of design as a "post-Promethean moment of action."

As a place of permanent redesign – or permanent becoming-with – prototyping radicalizes this ethos of care in its operation because it never starts from a *tabula rasa*, never creates *ex-nihilo*: its opening is based on a permanent calling to failure and redesign of that which already exists. This way of being (fragile and porous) transforms the prototyping process into a privileged place for thinking

[1] For Stengers, "cosmos refers to the unknown constituted by these multiple, divergent worlds and to the articulation of which they would eventually be capable" (Stengers 2005:995).

with care (Puig de la Bellacasa, 2017; Calvillo & Mesa del Castillo, 2018), creating entanglement with entities beyond the human. In this regard, anthropologist Alberto Corsín Jiménez (2014) notes that prototyping is a mode of action that is permeable to the intervention of non-experts whose action favours a counter-hegemonic "epistemic culture" strengthened by collaboration, fluidity and recycling (Corsín Jiménez, 2014). Complementing this argument, DiSalvo (2014) recognizes the potential to detonate renewed practices of research and political action by means of critical making as a distinctive quality of prototyping (Bjørgvinsson et al., 2012; Michael, 2012). For Mike Michael (2012), the emergence of these new forms of research is related to the cyclical nature of prototyping and its ability to accommodate idiotic misbehaviour, generating new ways of inventing and understanding the social (Wilkie, Savransky & Rosengarten, 2017).

We argue that the main strengths of prototyping are its material fragility and its capacity for attentiveness: through its successive failures, it manages to make available events and inventive situations. Like accidents, the prototype places us in the presence of certain eventualities that escape attempts to engage in prediction and scalability. Its malleability and vulnerability allow for the deployment of careful ways of addressing the entities involved in its transformation. In other words, it forces us to pay critical attention to the specificity of other species and their lifeworlds. In contrast to the modern notion of the laboratory experiment[2], prototyping captures and mobilises the fragility and indetermination of its own action and releases the identity of the beings it summons (Tironi & Hermansen, 2018).

Thus, we propose that prototyping offers us a privileged opportunity to rethink the atmospheres of cosmopolitics through correspondence. Prototyping refrains from engaging in pretensions of universality and instead claims procedural and situated action, allowing us to imagine and materialise “species interdependence” (Haraway, 2008), becoming a way to ‘individuate the problem’ (Lury, forthcoming)[3] of more-than-human entanglements.

4 Case study: From problem-solving to attentiveness

In the methodological framework of the TDI-UC, the students had to develop their design project under the precepts of problem-solving and user-centred design. The exercise involved an ethnographically-inspired method of observation and recording that entails the knowing of the future users of the environmental enrichment device by means of a description that stabilises their needs and qualities. Articulating their non-participating observations with a review of ethological documents on gibbons, the students’ aim was to observe the behaviours, routines, interactions and difficulties experienced by animals in their daily lives. Based on this research, the students had to develop a survey of the ‘ecology’ of the zoo which included interviews with the zookeepers, scientists and visitors; observation of their information systems, and consideration of the climate, vegetation, infrastructure and equipment.

In order to initiate a prototyping process using this approach, the students had to identify and formulate a “design opportunity”. This logic is currently used in the methodology of Design Thinking, client-oriented-design and the world of innovation in general (Kelley, 2007; Martin, 2009). The link between opportunity and value creation emphasises a process of 'need finding' under the assumption that the design opportunity will emerge from an operation oriented towards *extracting* the problems experienced by users as highly defined entities. Therefore, formulating a design opportunity forces designers to enter the prototyping phase with hypotheses or questions that are clear and empirically verifiable. This allows us to iteratively and experimentally refine the response to the opportunity through a series of functional prototypes whose purpose and meaning is to arrive at a final product, the resolution of a given problem. This logic also seeks to minimise ignorance and uncertainty about the scope of intervention if the recipients are deficient subjects on behalf of

[2] For more information on this point, see Despret, 2008

[3] For Celia Lury, the “individuation of a problematic” is a process of activating the present (and not just an abstract matter), a material accomplishment of the doing of a method, composed of a set of components.

whom the experts will design a solution. Finally, in this paradigm the prototype makes sense if it serves to solve some of the problems identified in the user and thus increase the efficiency of an original future. Each prototype is a temporary means for testing certain qualities of a product that will only be *real* once it is inserted into the market.

It is precisely this principle of the "design opportunity" which was subverted by the group of students in charge of designing, producing and implementing a device to enrich the gibbon's environment through their prototyping process. Though the group of designers (which called themselves the Gibonas) successfully completed the observation and identification of certain problems of the recipients (a group of four gibbons: a couple, their daughter and grandchild), they found that their preliminary exploration did not give them enough information to be certain about the profiles of the four gibbons and the critical interactions that the research question for the first prototype should sustain. While the docent team sought to encourage the students to identify the problem and develop intentionality around their response to it as a design opportunity, the Gibonas chose the unexpected option of using the first prototype mainly as a means to explore and record the gibbons' spontaneous behaviour, not as a way to define a future product. The Gibonas thus described their first prototype as "a network of jute cords placed in a random and basic manner" (Gibonas, 2016).

Figure 1: General view of the first prototype (Gibonas, 2016).

This situation led to a controversy that included the team of docents and the students as well as the zookeepers and the gibbons themselves, evoking two sensibilities or ways of approaching the project. Following Ingold (2013), these can be described through the figures of the theoretician and the artisan in a scenario in which the former "makes through thinking and the other thinks through making" (Ingold, 2013, p. 6).

The TDI-UC docents argued in favour of design through thinking, that is, projecting a material response, in this case a prototype, based on a research question. This approach assigns the capacity to mediate and translate interests and knowledge to the prototype as an object. By contrast, the Gibonas tacitly adopted a thinking through making (Ingold, 2013) approach.

Through this becoming-with (with the gibbons, the zookeepers, the materialities of the prototype and the enclosure), the Gibonas entered the prototyping process with a move that went against the hegemonic methodological canon, a canon that the docent team had adopted in collaboration with

the ZNdC scientists. Articulating a practical alliance with the zookeepers –those who directly work with the animals and ensures that the prototypes meet safety and building standards-, the students avoided associating their first prototype with a concise question, operationalising their imperfect knowledge of the gibbon family. Because they lacked specific objectives that would allow them to validate the success or failure of their prototype, the Gibonas transformed this first prototyping experience into a malleable territory in which to materialise their uncertainties and observe the gibbons' preferences.

We could say that the Gibonas allowed themselves to be guided by the "idiot's murmur" (Stengers, 2005, 2010), that is, by radical uncertainties regarding the solutions that they were to provide. Stengers uses this conceptual figure –which Deleuze and Guattari (1994) take from Dostoevsky- to describe how we should exercise and address scepticism regarding anthropocentric forms of thinking about the collective without prerequisites on a cosmopolitical horizon. The Gibonas did not mean to arrive at a result, but to turn the meaningless into a creative and generative prototyping process that is constituted from dissent. This idiotic reticence does not come from a perfectly thought-out reason or the suspicion that the statu-quo could be imperfect. The idiot simply believes that, perhaps, "there is something more important" though incomprehensible that goes beyond the way in which the situation is presented (Stengers, 2005, p. 994).

Through their first intervention, the Gibonas approached the ecology composed of primates, docents, zookeepers, environments and scientists without seeking to impose an alternative theoretical framework, performing situated and affective knowledge motivated more by a sort of empathy with the gibbons than analytical reasoning. This situated way of knowing and being with others entails a move away from intentional rationality, a move that unfolds different gradients of attentiveness and correspondence. Following Haraway (2008), the Gibonas' performance meant "to hold in regard, to respond, to look back reciprocally, to notice, to pay attention, to have courteous regard for, to esteem: all of that is tied to polite greeting, to constituting the polis, where and when species meet. To knot companion and species together in encounter, in regard and respect, is to enter the world of becoming with, where who and what are is precisely what is at stake." (Haraway, 2008, p. 19)

When asked about their "idiotic" behaviour in the design and implementation of the prototype, they answered that their priority was to centre the prototyping process: "We think it is hasty to try to test a solution before having an initial encounter with the gibbon family. We know that we are not following the instructions, but we decided to follow our instincts and see what would happen with the simple installation of loosely tied together jute ropes, taking steps to ensure that we did not put the gibbons at risk." (Gibonas, 2016)

Figure 2: General view of the first prototype in use (Gibonas, 2016).

4.1 Who are we designing for?

The implementation of the first prototype in the gibbons' enclosure, which was conceived of as a malleable platform in which the family of primates could performatively express their preferences, encouraged the docent team to rethink the role of the designers as problem solvers and the gibbons as users. The idiotic behaviours that marked the first prototyping cycle opened up the project in unanticipated directions, slowing down the rhythm of the design process. When analysing the first intervention, the group described their findings as follows: "We don't know for whom we are designing if we don't consider the gibbons' reactions to our interventions" (Gibonas, 2016). When testing a prototype under a problem-solving framework, the analysis of user reactions is an imperative for product optimisation, but prototyping took on a different dynamic during this experience. The gibbons' reactions to the prototype could not be taken as inputs for improving or perfecting the original solution because, as we have seen, the first prototype eluded the operationalisation of a hypothesis.

Figure 2, which was captured after the implementation of the first prototype, shows how the gibbons surprised the designers and zookeepers by moving beyond the area provided for spontaneous use by sitting on the anchors that connect the net to the enclosure to observe the recently installed structure. Though this intervention was conceived of as a space that could be interpreted and did not provide a specific layout, the gibbons managed to find a space of subversion, using that which was apparently undesirable to stand on. This encounter seems to corroborate the idea that the encounter between agencies brings about unpredictable consequences and may surprisingly reveal hidden qualities of the entities involved.

The prototyping process becomes an opportunity to probe frictions and speculate about the enactment of an interspecies world. It forces us to think "in the presence of" (Stengers, 2005) that which we had left aside. The manifestation of this previously hidden subject brings to light the unanticipated consequences of our forgetting, pushing us to abandon the illusion that we will be able to predict how relationships between the parties involved in a certain ecology will develop. Nonetheless, the unexpected development of this prototyping precipitated an original experience of co-existence.

As a result, the gibbons' reactions could not be translated and incorporated into a preconceived model. Instead, they had to be interpreted as emergent data. The uses of the web were unique based on the skills, preferences and developmental stage of each of the four gibbons. Certain characteristics that had not been recognised in earlier observations emerged following the introduction of the prototype into the gibbon' enclosure:

> *The first prototype showed us things that we hadn't seen before. Sanuk used the tensest areas of the web almost exclusively. Kayak was always looking for spaces to interact with the ropes. Kena seemed happiest where there were loose ropes to play with and Jorja preferred stable, smooth places where she could be near her mother. (Gibonas, 2016)*

These observations were a call to slow down the pace of the work and change the approach. This meant moving away from thinking about a general solution for the gibbons, and using the single shared web to create personalised areas for each member in order to respond to their unique characteristics by reconsidering the importance of the care the zookeepers provide to each gibbon. The prototyping process becomes what Haraway (2008) describes as an "embodied communication," a dance in which the "flow of entangled meaningful bodies in time—whether jerky and nervous or flaming and flowing, whether both partners move in harmony or painfully out of synch or something else altogether—is communication about relationship, the relationship itself, and the means of reshaping relationship and so its enacters." (Haraway, 2008, p. 26)

The recognition of each gibbon's uniqueness had an ethical impact on those involved in the prototyping process. The docent team had to engage in a different dialogue with the Gibonas and the zookeepers. Instead of requiring specific statements and solutions that could be tested according to the protocol, they began to seek out ways of creating interspecies dialogue. The zookeepers also stopped being viewed as technicians and were recognised as true agents and co-designers: the idea of identifying unique areas within a single web was discussed a great deal with them. It is assumed that the gibbons' main partners are the zookeepers.

In this way, the docent team began to accept that the Gibonas had to explore the type of relationships that the prototype revealed and precipitated. As such, the original controversy gave way to an overhaul of the design method. This experience linked the docent team, zookeepers, ZNdC scientists and students to a higher level of reflection on the prototyping process.

5 Environmental enrichment as performative activity

A broader ecology of contingent correspondences began to be defined as they moved into the second prototype, now recognising as its purpose the construction of encounter value (Haraway, 2008) between humans, gibbons and materialities.

This was a point of inflection in the process of understanding environmental enrichment. The slowdown generated by the first "idiotic" prototyping showed that what enriches the environment was not necessarily a product designed to solve a need of the users, but the prototyping process itself and the multiple experiences produced. In other words, enriching the gibbons' environment no longer exclusively depended on the design of an artefact and the amenities that it offers, but the atmospheres, testing experiences and situations that unfolded throughout the prototyping, which generate "care and longing" (Ingold, 2017) and in which the entities involved in the prototype are always becoming-with. This inflection in the understanding of the notion of environmental enrichment also revealed the distinction between the prototype as object and product, and prototyping as an activity and process (DiSalvo, 2014; Tironi & Hermansen 2018).

Nonetheless, the net used in the second prototype was designed to include areas tailored to the character and preferences of each gibbon, differentiating the configurations, densities, grip points and tensions of each sector of the web (see Figure 3). The objective of the second cycle of prototyping was to consolidate the idea of a shared space while offering differentiated sectors for unique uses designed based on the preferences manifested by each gibbon. The prototyping

promoted a process of singularisation, showing how ineffective the references to the generic gibbons were. As the Gibonas put it, “With this prototype, we are seeking to address the specificities of each gibbon while maintaining a shared web. We consider the various stages of development, behaviours and needs, and are looking to increase interactions among them and promote the development of their unique qualities.” (Gibonas, 2016)

Figure 3: General view of the installation of the second prototype (Gibonas, 2016).

In contrast to the first prototype, which was idiotic in that no questions materialised, the second was designed to operationalise a clear hypothesis: the gibbon family could have quality time together on a shared structure in which each family member is located in the visual field of the rest of the group while each of the structure’s sectors welcomes the preferences of a particular gibbon. To put it differently, the prototype sought to take up each of the four characters recognised through the affordances of the object.

While the hypothesis incorporated into this second prototyping cycle pointed to the uniqueness of the gibbons and was based on original data, its object-oriented character imposed the predominance of the prototype over the prototyping process. The response of the four users to this methodological change was immediate: the behaviour of Sanuk, Kayak, Kena and Jorja exceeded the layout of the device. Once the second version was implemented, the qualities attributed to each gibbon proved to be circumstantial: their profiles did not match their behaviour. Moreover, instead of corroborating their uniqueness, the gibbons were mainly gregarious in response to the redesign of the web. As the zookeepers put it at the end of the first day of implementation, “Seems that today, they woke up in the mood to enjoy family life.” As a result, the different areas of the web, each of which was hypothetically compatible with the nature of one of the gibbons, was utilised as a meeting space, which was not part of the design script.

6 The primacy of the encounter

The next four cycles of prototyping showed that the gibbons gradually naturalised the jute netting. As Figure 4 shows, the gibbons repeatedly engaged in activities in different parts of their enclosure,

including the jute artefact. Their knowledge and familiarity with the device translated into less intensive but quotidian use. Despite the successive attempts by the Gibonas –with the zookeepers and docents– to establish a dialogue with each of the gibbons through the configuration of differentiated areas within their design, their modes of use, appropriation and reinterpretation of the device always called into question the suppositions and hypotheses of the design. As one of the zookeepers put it, “The gibbons have behaviour patterns, but that doesn’t mean that they won’t get bored after playing the same way for a certain amount of time. It is just like with people- at first you feel like a kid with a new toy, but then you get used to it and you use it in whatever way works for you” (Gibonas, 2016).

This made it clear to everyone involved in this experience that the will “to enfold” (Domínguez Rubio & Fogué, 2014) the needs of the gibbons in an artefact, the students' behaviour in a method, or the zookeepers’ agency in a technical role, clashed with the recalcitrances of each actor. Instead, the environmental enrichment occurred as an “event” (Wilkie, 2014), as the result of interspecies encounters that demonstrated their practical and affective interdependence (Haraway 2008). Following Judith Butler (2016), this interdependence makes our "precariousness" palpable. For Butler, "precariousness as a generalized condition relies on a conception of the body as fundamentally dependent on, and conditioned by, a sustained and sustainable world; responsiveness—and thus, ultimately, responsibility—is located in the affective responses to a sustaining and impinging world. Because such affective responses are invariably mediated, they call upon and enact certain interpretative frames” (Butler, 2016, p. 34).

The interspecies encounter analysed here—especially the experience of the first cycle of prototyping, in which affective correspondences were protagonists—made it possible for us to recognise the interdependency and precariousness of the entities that sustained and are sustained by the ephemeral world precipitated for the prototyping process. This recognition revealed the conflict between the two frames, namely, the anthropocentric and product-oriented approach inscribed in the user-centered methodology, and the performatively constituted one that "call into question the taken-for-granted character" of the first and manages to "provide the affective conditions for a social critique" (Butler 2016, p. 34-35)—in our case, a critique of the way design methods subjectify the entities involved.

Figure 4: The prototype naturalised in the enclosure (Gibonas, 2016).

The Gibonas' idiotic behaviour in the first prototyping is followed by the gibbons' 'misbehaviour' during the other five prototyping cycles. In other words, the unexpected reactions of the gibbons to the affordances of the prototypes revealed the resistance that recalcitrance offers to the efforts of the service or product design of objectifying (Despret, 2008; Stengers, 1997) or framing (Butler, 2016) the recipient. The recalcitrance of the entities studied that resists what is done to them tends to be minimised in conventional scientific practice (Despret, 2008). Instead of responding to the inventive responses that emerge from flare-ups of recalcitrance, researchers often consider these unexpected answers to their research questions an obstacle to the generation of scientific knowledge.

7 Conclusion. Attentiveness and fiction as modes of knowing

We described how the process of designing an environmental enrichment device for the family of gibbons at the ZNdC progressively become an ecology of attentiveness and mutual care. The intervention moved from informed prototype development based on a user-centred and problem-solving logic to an open-ended, experimental prototyping process that was sensitive to the exploration of interspecies associations. The TDI-UC's original goal of targeting and shaping the essential qualities of its recipients in order to define a design opportunity that would sustain a future product was undone by the prototyping process itself. The alignments and mismatches generated by prototyping allowed humans and non-humans leave their marks and challenged the programmes that were imposed on them.

We argue that the capacities deployed in the prototyping cycles allow researchers to test types of cosmopolitical encounters (Tironi and Harmansen, 2018), exploring ways to joining others in an ongoing and expeculaive process (Ingold, 2017). The very process of prototyping favours the recomposition of an interspecies environment, sheltering the delicate unfolding of an "us" based on the mutual care (Puig de la Bellacasa, 2017) and longing. This does not mean that we believe that all prototypes materialise cosmopolitics, but rather that the presence of certain qualities in the prototyping –fragility and care, recalcitrance and performativity- precipitate mutual interweaving between human and non-humans. The capacity of prototyping to slow down the processes not only challenges essentialist normativities, but also invites us to lay bare new forms of species interdependence, cultivating speculative skills for paying attention and making visible the precariousness inherent in each entity involved (Butler, 2016: 34-35)

On the other hand, we showed how the performativity of prototyping evokes new valorisations of animals-as-subjects. When interspecies prototyping occurs, new relationships and environments, spaces for becoming together and modes of correspondence between ontologies are created. It is important to underscore how the *indocility* of students and gibbons was not addressed as an obstacle, but as an opportunity for testing out new forms of interspecies dialogue. These recalcitrant situations forced the docent team to question its own capacity to impose a preconceived approach to the design of a certain world and to consider the complexity of the many modes of existence we deal with. The reactions of the gibbon family to human plans exemplify the uselessness of projecting our human image onto other-than-human beings. When confronting the need to learn from non-humans, prototyping offered us-humans an immersive and relational mode of interspecies coexistence that is as fragile and precarious as itself. In other words, in this movement towards an ecological awareness beyond the human or words and anthropology of life (Kohn, 2017), the experience of interspecies prototyping allows for the emergence of cosmopolitical encounters in which mismatch, affectivity and care are key aspects. As Haraway says, "It is a question of cosmopolitics, of learning to be "polite" in responsible relation to always asymmetrical living and dying, and nurturing and killing." (2008, p. 42)

Recognising that the zoo as an institution is the epitome of anthropocentrism, materialising the hegemony of humans (especially that of of white male scientists) in its capacity to maintain a particular regime of life (Grazian, 2015), we have shown that forms of "species interdependence" did appeared at certain points in the prototyping process. While working with the openness and fragility

of prototyping to welcome the coming together of ontological differences, we explore new forms of intimacy and correspondence between humans and non-humans. The affective experience of coexistence favoured through prototyping opens-up conditions for social interrogation and a rethinking of the zoo as well as design and allows for a critique of the "frames" that silently impose an order, a hierarchy of living bodies, whether human or non-human.

The affective approach bountied through prototyping invites us to deploy forms of attention instead of intention (Ingold, 2017), making explicit the permanent re-construction of our relationships. The cosmopolitical form of care performed by the Gibonas when they created an idiotic prototype that was open to gibbons' curiosity freed them from methodological impositions while opening up new ways of becoming together for everyone involved. Following Haraway (2008), "caring means becoming subject to the unsettling obligation of curiosity, which requires knowing more at the end of the day than at the beginning." (p. 36)

We believe that it is crucial to insist that prototyping as an event (Wilkie, 2014) or process -not as an object- makes the ontological differences perceivable and becomes a playground in which to generate practices of correspondence, mutual attention and care (Puig de la Bellacasa, 2017). Conceiving of prototyping as a process constituted mainly by situated knowledge entails an *ecological* understanding of design (Tironi and Hermansen, 2018): instead of striving to define and fix the entities included in the design project, we must consider how the set of components (practices, materials, relationships, living beings, environment, affects, discourses) are co-produced during prototyping. In other words, rather than thinking in terms of design-object, one must think in terms of the processes and events in which certain entities are enacted or are rendered possible. The fragility of prototyping invites us to seriously consider the notion that we cannot take any entity for granted because these are always re-occurring in an ecology of discontinuities and correspondences, of frictions and affections.

Finally, we propose that prototyping can be a privileged way of knowing and transforming the world, to investigating and modifying ecologies as realities in constant evolution, challenging linear ways of conceiving of the project. We do not aspire to conceive of a method to project global or scalable solutions, but quite the opposite: interspecies prototyping, always local and located, exceeds plans and rationalisations. This impels whoever designs and investigates to adjust to the ethics of care that prototyping enables. It is in this place of cosmopolitan encounters where recalcitrances, failures and frictions become resources for learning the art of correspondence.

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Critique and Post-Critique in Social Innovation Projects: between speculation and realism

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This paper discusses notions of critique, post-critique, speculation and realism, as it reflects through a practice-based design research project, which worked as part of a bigger Danish public innovation program with the involvement of citizens in the design of a new library and cultural house under construction. Specifically, the paper sets out to challenge what seems to be a dichotomous "either-or" thinking in the descriptions and analyses of practice-based design research projects. Accounts of design research that operates in overlapping landscapes of academia, public sector and business are often depicted as too solution-orientated and therefore not reflexive, too engaged and therefore not analytical or too pragmatic and therefore not speculative. Such dichotomies, the paper argues, tend to obscure the "in-discipline" of much contemporary participatory and constructive design research. The paper seeks to problematize this over-simplification of what it means to engage in critical knowledge work, as it draws on recent discussions in design research, science and technology studies and feminist techno science.

post-critique; critique; practice-based participatory research; feminism

1 Introduction

This paper investigates ideas of critique and post-critique in design research. The notion of post-critique, in the following, does not refer to one particular understanding of the concept, rather, it points to a landscape of ideas and dispositions interested in exploring new critical forms as alternatives to, or extensions of, notions of critique associated with particular methods, theories and traditions. Specifically, the paper deals with practice-based design research that works with public sector innovation, social innovation and participatory approaches informed by ideas from anthropology, science and technology studies (STS) and feminist techno science (FTS). The paper asks; what does a contemporary critical or post-critical approach look like from a practise of making many different things? How does critique take form in a direct engagement with partners outside academia, and how can the commitment to a change program of public innovation still allow for a

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critical investigation of becoming otherwise? These questions will be explored from what could be called "the complexities arising from dichotomies" (Redström, 2017, p. 1), complexities and entanglements probably familiar to most practice-based design researchers:

Sometimes the intellectual instability of being in the middle is so overwhelming that we are tempted to give in to the at least academically much more convenient position on either side: to choose between theory or practise, art or science, and so on. But design can also be remarkably resilient and willing to commit to all that which is neither black nor white, but complex and colourful. (Redström, 2017, p.1)

The musings of Redström are perhaps especially true for researchers working in project set-ups that transgress boundaries between academia, public sector and private partners. Here conditions of evaluation must be handled between explicit change programs of non-academic partners that the researcher commits to, and the often not fully conceptualised epistemic and critical ambitions of the researcher. Moreover, design researchers who stretch notions of design beyond questions of form, function, aesthetics and discrete products, and who choose to work practice-based, rather than attending to design as cultural phenomenon and object of analysis, may complicate discussions on critique even further. Critique and post-critique is not just a question of theories and concepts, some of which may circulate rather freely among design researchers invested in exploring design as a social process, and constructivist social researchers who emphasise the performative element of any method (Law, 2004). Inevitably, an exploration of critique and post-critique in design research becomes also a question of methods and how they participate in drawing lines among research traditions and even disciplines (Lury & Wakeford 2012). It is precisely in this contemporary mix of academia, public sector, business, independent activist organisations, theories, methods and concepts that critique and post-critique in constructive and participatory design research, is shaped and takes form. The aim of this article, however, is not to fully define or circumscribe concepts of critique and post-critique, nor does the exploration of what critical and post-critical engagements can mean for a practice-based research agenda start with a fixed and clear understanding of those same concepts. Rather in the following, ideas of critique and post-critique, in their different guises, will be related to questions of speculation and realism in design engagements that collaborate with non-academic partners under the auspices of an explicit change program.

2 Critique and post-critique

Concepts of critique and post-critique, in some disciplines, for example in literary and cultural studies, may be thought of as a genre, and for some, critique may even be a shorthand for theory. Traditionally, critique in the humanities is associated with Marxist thought, Kant, the Frankfurt School, and post-68 French Theory (Anker & Felski, 2017, p.13), but new post-critical positions are also emerging, retaining perhaps a critical ethos, but giving the critical disposition new forms. The proposition that critique has run out of steam, posed by Bruno Latour in 2004 (Latour, 2004), has led to intense debates. In a recently published collection on the "post-critical turn" in literary studies, editors Anker and Felski sketches out a landscape of positions. While some scholars construe the post-critical turn as a precarious sign of defeatism (Anker & Felski, 2017, p.18), the current objection to critique, they contemplate, is perhaps a consequence of the way that critique nowadays has become mainstream and normalised within academia. Critique in present-day may perform as nothing more than yet another research method in the neo-liberal university (Anker & Felski, 2017, p.13). This leaves much to be desired when it comes social and political transformation. One defining trade of a more traditional critical approach, is a preoccupation with revealing presumed underlying structures, and a fundamental scepticism towards anything essentialised, institutionalised or naturalised. By the same token, there seems to be a general suspicion towards ordinary social actors, language, and thought, and a taken-for-granted lack of reflexivity of everyday settings. This has led to critique of critique; problematizing the suspension of the commonplace, while construing critical thinking as the exclusive provenance of intellectuals in academia (Anker & Felski, 2017, p.14). Post-critique on the other hand, moves forward, this at least is a popular indication, by way of a

deep empiricism and realism. Tracing in quite a dis-enchanted approach a sort of relational objectivity of "what-is". But as pointed out by Heather Love (2017), Latours' encouragement to cultivate a "stubbornly realist attitude" (Latour, 2004, p.51) rooted in a technology of tracing, may have a tendency to foreclose important discussions. Love draws on feminist scholar Donna Haraway's "Modest_Witness@Second_Millennium (1997) to reflect on for example categories of gender. In a feminist critical engagement, it is not enough to simply describe matters of concern against a static background of dominant categories and technologies. A critical engagement must involve acts of both stabilisation and de-stabilisation because everything is constituted in action and "in-the-making", not before action starts (Love, 2017, p.57). Following Haraway, one cannot judge in advance, which methodologies will do justice to the research objects nor which will open for social transformation (Love, 2017, p.54).

3 Design and Critique

Thinking on how notions of critique and post-critique are laid out and debated in the humanities and the constructivist social sciences, in practice-based design research lines may be drawn in alternative ways. First of all, design as a broader field may be said to be inherently speculative. Precisely because design as practise and profession works by making proposals, sketches and models of what could be. Therefore, in its outset design is never solely concerned with a realist "what is", even if the design process may harbour all sorts of realist research methods, like for example planning, data collection, modelling and such. Similarly, and in the broadest sense, design is rarely associated with critique. The legacy of design and its relation, not only to modernity and progress as ideals (Bürdek 2005), but also to industry, production and commercial interests seems fundamentally at odds with classical critical practises. And yet, particular trajectories of artistic avant-garde practises, design education and design research projects have employed different strategies of design with the specific aim of raising critique, open up debate and create social transformation. Prominent examples are design research traditions like critical design, centred around the milieu of the Royal College of Art in London (Dunne 1999, Dunne & Raby 2001, Dunne & Raby, 2013), but also various forms of speculative design projects (Ward & Wilkie, 2009, Galloway, 2013, Gaver, Michael, Kerridge, Wilkie, Boucher, Ovalle, & Plummer-Fernandez, 2015, Wilkie, Michael & Plummer-Fernandez, 2015) and critical making in academia (Ratto 2011). Matthew Malpass, in his doctoral thesis (2012), traces schools and practises of critical design from the artistic avant-garde practises that formed the movement of radical design in the 50ties and 60ties in Italy, over the Bristol School of Construction, to the anti-design movement with groups such as Superstudio and Archizoom (Malpass 2012). Contemporary speculative design projects, according to Malpass, may be seen as a particular form of critical design (Malpass, 2012, p. 50), albeit more interested in deploying speculative prototypes in domestic settings than provoking critical thought in galleries. Interestingly, speculative design research projects are usually strongly influenced by ideas from analytical movements like STS and actor network theory (ANT)(Wilkie & Michael, 2009, Gaver, Boucher, Bowers, Blythe, Jarvis, Cameron, & Wright, 2011), and also typically orientated towards developments in the field of interaction design; bringing advancements in technologies to bear on creative and critical approaches to human computer interaction (HCI) (DiSalvo 2009, 2012). Another and different trajectory within practice-based design research, which is also informed by discussions in the social sciences and advancements in new technology, are research projects that work from traditions of participatory design (PD). Here, a once more explicit emancipatory and critical agenda, which focused on involving workers, whose jobs would otherwise be lost to technology (Ehn, 1988, Blomberg Simonsen & Robertson, 2012, Kensing & Greenbaum, 2013,) is also gravitating towards a less "classic" critical disposition. This is evident in more contemporary versions of PD that are taking participatory strategies out of the workplace (Björgvinnson, Ehn & Hilgrenn, 2010, Hilgren, Seravali & Emilson, 2011, Ehn, Nillson & Topgaard, 2014) to engage with both public and private partners around open social innovation. Such engagements may take forms closely related to service design, for example related to the design of welfare technologies. Or they may work with independent

organisations and NGOs to support entrepreneurship and social change in diverse cultural domains (Ehn, 2008) While yet others, may take on more artistic inspired approaches and with less commitment to an explicit change program of design. For example, where invitations are carefully crafted to pursue participatory strategies, not with the aim making specific design proposals, but rather to open up dialogues on the complexities of living with technologies (Lindström & Ståhl, 2014). Thus, the question of critique and post-critique is vibrant in different trajectories of design research, as well as in different design research environments. Manifest in a variety of design projects that exhibit different styles and aesthetics, which however also overlap sometimes.

3.1 Between speculation and realism

The interest in this paper, is the critical and post-critical potentials in practice-based design research projects that work from within quite explicit change programs that are typically formulated outside of academia. This is for example often the case in participatory and co-design research projects. This kind of research is sometimes criticised for buying into dominant ideas of usefulness and instrumentalism, and being unreflexively co-opted by the utilitarian regimes of present-day universities (Anker & Felski, 2017, p.19, Zuiderent Jerak & Bruun Jensen 2007, p. 230). But interestingly enough, participatory strategies in constructive design research are also sometimes criticized for being too naïve about their own ability and power to change facts on the ground. Because while they claim to be making a difference for "real life" actors, in reality most participants are enacted to fit the program of the research project (Pedersen, 2016, Yndigegn, 2015, Palmås & von Busch, 2015, von Busch 2017b). This conflict and dilemma can be described through the positions outlined in two recent publications.

In the collection "Speculative Research – The Lure of Possible Futures" (Wilkie, Savransky and Rosengarten, 2017), the speculative inclination inherent to design, is turned into a topic for cultural and social research. Speculative research, the editors argue, is a mode of research and knowledge making that goes beyond business-as-usual approaches. In order to wrestle futures and possibilities from dominant visions of singular futures associated with planning, calculation and the probable, speculative research opens for (im)possibilities and alternative futures that does not presume the future to be, just a prolongation of the present. Invoking speculation as a contemporary critical gesture, the editors want to challenge the presumption that time moves linearly, along a modern arrow of progress. What matters is how we think time and stage time because possible futures are not objects of knowledge, but rather vectors of risk and creative experimentation. This realisation, the editors argue, should compel us to reclaim speculation from the shadows of probability, by cultivating a temporality that the editors refer to as eventful.

A quite different perspective on speculation has recently been offered by Otto von Busch and Karl Palmås in an article titled "Social means do not justify corruptible ends: A realist perspective on social innovation and design" (2017). Here speculation, embodied in the quite small and unpretentious "what-if"-question so often associated with design is problematized for lacking realist impact. Through a critical account of literature in the field of social design and innovation and based on a survey of the literature on micro-finance, the authors question the "real" social and positive effects of social design and innovation. The appraisal of social processes in design, often staged through strategies of participation and a focus on users, should not lead us to believe that such processes automatically lead to positive social ends. The problem, as Busch and Palmås conceive it, is that in the literature on social design and social innovation, beneficially social outcomes are implicitly expected to somehow automatically follow from a socially focused design and innovation process. To meet these shortcomings, von Busch and Palmås call for a cultivation of a realist attitude and propose that designers draw inspiration from political theory to observe how lines are drawn between realism and idealism. In a very simple model, the idealist works by posing "what-if" questions, whereas realist questions would focus on who and how. Busch and Palmås derive a so-called realist "who-whom"-question from a series of questions they recommend to be posed at the start of any social innovation project. Questions such as; "who is the user", "how is the social re-

distributed" and "who earns what in the end", should be posed to provide clarity and realism in processes of social innovation and design.

To sum up, Wilkie, Savransky and Rosengarten stage speculation as a much-needed virtue, that neighbouring disciplines may appropriate from the practice of design. A speculative strategy raises critique of the manageable, calculable and probable and the conditions of evaluation that researchers have to answer to. Von Busch and Palmås point to realism and inspiration from political theory as a possible pathway for design, to overcome its idealist tendencies. The realist strategy raises critique of good intentions and idealism in process-orientated design and innovation. This is design that is not probable enough, so to speak. It lacks impact, and impact here must be understood as a critical gesture, insofar as it constitutes an over-turning of for example dominant economic systems or prevailing social forms.

Thinking through a constructive design research project that dealt with social and cultural innovation in the context of the Danish welfare sector, I suggest that much process-orientated and practice-based design research that transgress boundaries between academia, public sector and private partners, proceed through a kind of speculative pragmatism. This can be described as a sort of unsettled middle position that is both realist and idealist. It works quite pragmatically from encounters in the field, and at the same it tries to reach out to alternative futures, through a committed and direct engagement with the plurality of the present. To further elaborate on this, in the following I draw on experiences from work conducted around an informal maker space below a small library. The maker space was part of a bigger public innovation program that focused on the involvement of residents living in an international urban neighbourhood, in the design of a new high-profile library. In one way, the temporary maker space worked in line with dominant ideas of library institutions, citizens and users. At the same time, it formed a speculative alternative to prevailing ideas about maker activities in public libraries, and the citizens they are intended for.

4 It all begins and ends with making and fixing

A group of residents in the social housing project and international neighbourhood, Tingbjerg, on the outskirts of the Copenhagen metropolitan area, has gathered in a basement below their local library to participate in a three-day festival of fixing and making. Olli and Ahmed are sitting next to each other at the big table close to the window facing the street. Ahmed is in his early twenties, of Syrian descent and works as an electrician. Olli is an elderly lady and senior citizen, of Danish descent. She has been living in the neighbourhood of Tingbjerg since she was young, and she is now well over seventy. Ahmed is teaching Olli how to wire a plug. They are in the centre of the open room, amidst a lot of buzzing activity.

> *Ahmed: "Just gently, don't worry". Olli is getting ready to cut the wire, concentrating as she prepares to get the cut just right.*
>
> *Ahmed: "Like that, that's right". Olli finally cuts through the wire and as if in surprise of herself, makes a small jump in the chair.*
>
> *Ahmed: "That's perfect, just perfect". Ahmed smiles. Olli smiles as if relieved, then she looks at Ahmed.*
>
> *Olli: "Where is your family from?"*
>
> *Ahmed: "They are from Syria"*
>
> *Olli: "Syria? That's the place with all that trouble going on all the time"*
>
> *Ahmed: "Yes, it's sad"*
>
> *Olli: "Yes, it is"*
>
> *Ahmed: "But we don't have family in Syria anymore"*

Ahmed and Olli don't really know each other. Although they have both been living in the same neighbourhood for years. Olli is very active in the community. She takes part in all sorts of different cultural activities whenever she can. Ahmed doesn't really visit the local Tingbjerg library that much. But one day, as he passed the big window panes facing the main shopping street, he fell into conversation with Martin, a master student of co-design who is hosting the informal maker library. One thing led to the other, and now Ahmed is hosting a workshop on how to wire a plug, as part of the fixer festival program. The fixer festival is a culmination of a longer series of events around making and fixing that has been taking place for several months in the space below the library. Design researchers, design students, staff at the library and local residents have been working to establish a public space where the diverse community in Tingbjerg can meet around activities of fixing, making, redesign and upscaling. All these events, from the weekly repair café to the well prepared cultural program of the fixer festival, are part of a larger development process related to the future combined library and cultural centre that is currently taking shape at a construction site somewhere else in neighbourhood. But during the fixer festival no one is really discussing the future. Residents, librarians, design students and researchers are too pre-occupied with what is going on in the present.

4.1 Working on the margins of the pre-scripted process

The fixer festival running over three days in May, 2016, may be seen as an experiment, a prototype or an open full-scale rehearsal in situ. In hindsight, this seems a precise enough description. However, this event, formed around a well-prepared program involving local residents, library staff, local businesses, youth clubs, the public school, managers, researchers and design students, is all the time working on the margins of a larger planned innovation process, into which the informal maker space is folded. The future vision of the new library, which can be found in municipal strategies, policy papers, and the renderings of architects, is part of a bigger developmental plan to lift the area over the next 15 years. The long-term plan is to restore the area and transform it. From a neighbourhood, which is home to a diverse migrant community, and figures with high unemployment rates and widespread social problems in national statistics, to a gentrified vibrant neighbourhood that will attract new businesses and new groups of middle class citizens. The temporary maker space that has been set up below the old and worn-down library, may be seen as taking part in this pre-scripted work of transforming the international neighbourhood. Because the new library is promoted as a first important step to turn things around. And the idea of a maker space is central to the plans of the new library. In many ways then, the maker space aligns perfectly with the cultural strategy that has been issued by the municipal administration. But the provisional maker space may also be seen as a critical speculation. A makeshift space that tries to slow down the acceleration of future visions in the housing projects. By taking seriously the richness of everyday life in the neighbourhood.

4.2 The entrepreneurial citizen and the individual maker

There is a lot to be said about maker spaces in libraries (Burke, 2014, Moorefield-Lang, 2014) and not all of it goes well with a critical disposition and a healthy scepticism towards managerial lingo and IDEO aesthetics. Browsing through online descriptions of maker spaces hosted by public libraries in Scandinavia, they are usually promoted as spaces that provide access to high tech equipment like 3D printers and laser cutters, where everyone can sign up for tutorials, to learn the latest DIY production techniques. Maker spaces and Fab Labs are sometimes praised as the future drivers of public libraries, bringing Arduino kits to the people and providing free platforms for citizens to unleash their innovative and entrepreneurial potential. In times where libraries are trying to find their feet, with the decline in loans and digitalisation pervading library services, the ethos of the maker movement (Dougherty, 2012) and the promise that everyone can be a maker, sits well with a more classic and individualised enlightenment project. One that is still mobilised as identity marker in the library debate. In a classic definition, a library is a building containing a collection of books, periodicals and recorded music, yet many public libraries are transforming themselves into cultural

centres under the popular motto “from collection to connection” (Audunson & Aabo 2013). And still singular ideas of citizens and users permeate policy papers and strategic visions. As noted by Ramia Mazé: “The future is by no means empty – it will be occupied by built environments, infrastructures and things we have designed” (Mazé 2016, p.37). Whatever methods and dispositions we work by as researchers, we are somehow plunged down into the middle. For example, In the strategy for Copenhagen libraries (2014-2019), two distinct and yet quite opposing images of citizens are hypothesized; one is the remote citizen, completely self-reliant and efficiently provided for by new digital library services. The other one is the ever-present citizen. Engaged and active, innovative and entrepreneurial. When local smaller libraries are transformed and reorganised into bigger cultural units; promoted as local hubs where users become producers and project makers, while digital solutions and unmanned opening hours are replacing face to face interaction, these are the citizen-models they are providing for. But perhaps, in order to work as strategic tools, policy papers and architectural renderings have to stretch the singularity of future visions to the stereotypical. Simply because, that is precisely how they become operational for politicians, managers and decisions makers. And of course, despite digitalisation and strategic models for transformed futures, everyday life at public libraries and cultural centres unfold in much richer and more interesting ways than policy papers can convey. The Tingbjerg library, for example, is a library with a strong social profile. The staff, in the face of cutbacks, still emphasise the personal encounters with residents over efficiency and loan of materials. This is also why citizens keep coming to the library for many different reasons. Residents tend to seek assistance with all sorts of things; like writing an application or reading a letter from the municipality. But most residents visit the library simply to hang out, meet with others, and talk to librarians and cultural workers.

4.3 Inviting for the un-heroic citizen

Contemplating on the meeting between Olli and Ahmed at the fixer festival, which was captured on film and made to travel among managers and decision makers in the research project, we may notice that they are not really performing as project makers or omni-competent citizens. Olli is definitely being taught how to wire a plug, and Ahmed is taking on the role of the encouraging teacher, in that sense they resonate convincingly with the images of citizens and users that dominate policy papers and future visions. But what was noticed when this small snippet was edited into a two-minute film that showed different maker activities going on below the library, was this dialogue between a young man from Syria and an elderly Danish resident. From a distance, this encounter is conventional and commonplace. There is hardly anything more mundane. It is not doing much to charge the future. But for some reason, this encounter reverberated as truthful and important, when showed at panel debates and workshops related to the future of the public library and the neighbourhood. Perhaps because it reminds us of the plurality of the present? As researchers, we may need to be reminded. The same goes for designers, managers, policy makers and politicians.

For example, when we embarked on the research project, we soon discovered that maker spaces in Tingbjerg are not exactly something new. As it turned out, the neighbourhood already had quite a rich culture of making and several maker communities. Many of these communities were well-established, like seniors doing needlework at the local church, or Muslim women running a café and doing Henna designs, or a group of fathers meeting once a month to cook together. All these different groups were the ones we had been commissioned to involve in workshops and debates on the future of the new library. But the original and genuine intention of involving a diversity of residents in a design process that could feed directly into the design of the new library was not practically possible. We did not have access to or control with the overall progress of the new library project. Furthermore, many decisions around the design of the new building had already been made, and the time schedule, because of the complexity and tight protocols of the overall plan, was constantly being changed. I don’t think the scenario described here is unique. It is probably quite often the case that pre-conceived plans for user-involvement and innovation, which look doable on

paper, turn out to be much messier and complicated in real life. In the Tingbjerg case, we found it increasingly hard to invite for workshops and debates when we didn't have the means to channel those ideas further. We did however, slowly begin to see an opportunity in latching on to the concept of a maker space. Even if we knew, it had to be a different kind of space for making than the one projected by architects, managers and politicians.

4.4 Complicating the idea of maker spaces

Looking back, I will describe the shift, from the initial focus on a more classical user-involvement process, to a series of rehearsals in situ, as simultaneously a pragmatic and necessary move, but also as a critical-speculative move. In a team of design researchers, design students and library staff, we worked through a process of exploring what was already there. Working from an anthropological ethos of the everyday as meaningful. During the first period of the project, we had learned that workshop facilities for knitting, sewing, needlework and different kinds of arts and crafts was something that many residents in the neighbourhood longed for. And we were told by many, and could see for ourselves, that the local library was in fact the only public meeting place in the neighbourhood. Despite the diversity of maker activities and communities in the area, most of these activities were centred around the social and cultural life of particular groups, for example, seniors, schoolkids, fathers or Muslim women, and there seemed to be very little exchange among them. What we started to envision, in conversation with residents, maker communities, and library staff, was "making" as collaborative activity of sharing across ethnicities, gender and differences in age and religion. Our common vision, based on the library as an important public space, was a public studio format of sorts; an open frame for low cost, non-expert fixing and making. Therefore, we worked out a cultural program for the space based on a few simple rules:

- The space is open for everyone, and no special skills are required.
- Anyone can drop in as they like, even if just for a cup of coffee.
- Maker activities start with materials at hand and grow from the interest of residents.
- Activities and things produced in the space are documented, celebrated and circulated by library staff and design researchers, to communicate to managers, architects, and decision makers what is going on in the basement.

This was the very simple program we prototyped over a period of around six months leading up to the fixer festival. What we ended up with, besides a mixed community of everyday makers, were only slightly agitated versions of the everyday. Because in the end, the important thing is not that Olli can wire a plug, although this can be a very useful skill. What is important is the encounter itself, and the surprising unlikeliness of it, in a neighbourhood where different groups live so close to each other. In that respect, the provisional maker space is not spectacular, radical or particular future-oriented. But from its mundaneness and its appreciation of collaboration and dialogue, it does comment on and alter the way we can talk about and think about the future. Trying to show, not tell, that he future of public libraries and the engagement of citizens is not all about self-service or full-service. Whether or not these tactical and to some extent, practical and opportunistic moves can be seen a critical, is difficult to decide once and for all. And so is the impact and realism of our participatory endeavour. Today, almost a year after the research project has ended, the informal maker space is still running open repair cafés and workshops, and the community in the basement and the library staff are still waiting for the grand opening of the new library.

5 Engaged and critical: The paradox of a practice-based approach

Working on the auspices of explicit change programs that promote prescriptive and singular visions for the future, does not necessarily thwart a critical stance, but it somehow makes it more complicated. In a practise-based research engagement there can be no simple answer to the reassessment of critique, besides perhaps, a realisation that the somewhat romantic image of the critique as heroic dissident that manages to keep her distance in the rarefied space of the academy is no longer productive. As noted by Maria Puig de la Bellacasa in her compelling account of care:

“Thinking in the world involves acknowledging our own involvements in perpetuating dominant values rather than retreating to the sheltered position of an enlightened outsider who knows better (de la Bellacasa, 2017, p.10). In present-day universities, with funding programs relying on modern planning schemes, linear methodologies of innovation, and simple models for evaluation, practice-based design researchers are often enrolled as partners in cross-sectional innovation work to offer creative experimentation that can inform the overall project vision. Design researchers after all, are rarely invited to obstruct and intervene directly in decision making and policy design. In a very practical and pragmatic sense, such conditions challenge any attempt to draw simple lines between critique and composition, reflexivity and action, slowing down and caring about the usefulness of one’s own design interventions. And just like critique in the humanities is indebted to linguistic models and tied to particular epistemologies; like analytical models of interpretation and certain genres and styles, so is critique in design research often associated with particular aesthetics and forms. This is perhaps why vectors of experience that exceed such frameworks are rarely counted as critical. The richness and complexity of everyday stories and low-res images in municipal leaflets and quickly edited video clips, may look a lot like more of the same, and not at all like critique. Compared to for example highly aestheticized design objects, exhibited in galleries or staged through a series of professional photo shoots, in a full synthesis of how things, technologies and futures could be otherwise. Wilkie, Savransky and Rosengarten talk about the lure of possible futures, as something more than a mere extension of the present. As some inventive and experimental engagement, that can confront the impasse of the present (Wilkie, Savransky and Rosengarten, 2017, p.2), without simultaneously submitting them to logics, rationales, and habits that govern the problematic of the present. This challenge, I argue, thickens in any research projects that commits to an engagement with change, and insists on critique as generative and productive, not only for researchers in the university, but also for collaborators outside of academia. This requires, I contend, an approach that works with dominant visions of modern planning schemes, quite a bit of the way. But still with a cultivated sensibility, that no matter how pervasive the impasse may be, it can never exhaust the unrealised potential of the present (Wilkie, Savransky and Rosengarten, 2017, p.8). In a strange way, this attention to and caring for the situated engagement of the present, necessitates a pragmatism, if not opportunism, that is also highly realist. Working through a series of quick contextual experiments, and from the materials at hand, is not very idealist. So, while Busch and Palmås (2017) may be right, that social innovation projects can learn from political theory, realist question that focus on who and how, can never be fully answered, not matter how strategically one enters a social innovation project. Instead, as Anker and Felski propose; in a rethinking of critique, we may need to forge stronger links between intellectual life and the non-academic work. And we should not accept that such stronger links are automatically a matter of capitulation (Anker & Felski, 2017, p.19). Rather this is perhaps where we will find new openings and surprising companions among social actors, public servants and decision makers who are also invested and critically engaged in creating the conditions for change.

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Heart Sense: experiments in design as a catalyst for feminist reflections on embodiment

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This paper presents the design of a series of experimental data visualizations aimed at reflection and conversation about embodied interactions and physiological data. Taking heart rate as the point of entry, these visualization challenge binaries such as matter/meaning, subjectivity/objectivity, and self/other. More specifically, we present three visualizations. The first one illustrates physiological interaction with emotionally engaging material. The second one explores the experience of time by centring the rate of heartbeats. The third one foregrounds the impact of the environment on physiology and its role in creating a kind of embodied social connection. Together, these three visualizations open up space for new problem formulations and design explorations in and around the themes of data, embodiment, and visualization that are distinctly feminist in their orientation.

feminist science and technology studies; physiological data; data visualization; interaction design

1 Introduction

How can the very creation, rendering, and experiencing of biological data be distinctly feminist? For example, how can it start from women's lives in all our plurality and complexity,[1] break down binaries such as objectivity/subjectivity[2] and science/feminism,[3] and contribute to a more nuanced understanding of our bodies—a kind of knowing that is in and of the world?

Heart rate data may seem like a counterintuitive choice as an entry point into these questions. The monitored heart rate can be very mechanistic and even disciplinary: the persistent mechanical beeping during surgery (Kneebone, 2017), the fetal heartbeat of anti-choice politics (Edgar, 2017), monitors that can spur excessive intervention in childbirth (Cartwright, 1998), and even fitness monitors that incite increased intensity in exercise (Pirkko and Pringle, 2006: 59). Heart rate can be a site of plural layers of "control by quantification" (Browne, 2015: 9). Yet the heart remains ambiguous and undisciplined. In times of emotional intensity, a racing heart rate can feel very much

[1] A complex but worthwhile undertaking—see, for example, Harding (1993).
[2] This has been canonically explored in foundational texts of feminist STS, including by Keller (1985) and Rose (1983).
[3] As inspired by Subramaniam and Willey (2017).

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out of control. At the same time, we can feel our own heartbeat and that of others with whom we are intimate. In this manner, heart rate offers an accessible route into engaging with our bodies. This mundaneness and accessibility, in turn, makes it less likely that data about the heart could mechanize subjectivity the way that data about, say, the brain might. The heart's pace is at once most intimate and personal, while simultaneously deeply connected to others and the outside world. Creatively engaged, heart rate can offer an intriguing point of departure for feminist engagement with the entangled nature of data, matter, and meaning both in theory and practice.

In this paper, we present ongoing work that draws together scholars from science and technology studies, physiology, and design to seek speculative ways in which heart rate and other physiological data might facilitate new explorations of embodiment. We do not take biological data as a given and theorize from there. Rather, we engage with both the generation and analysis of data in ways that foreground the inextricability of matter and meaning. And, unlike what is common in discourses around data in recent years, what we seek is not the kind of data collection that might produce patterns for scientific discovery. Neither do we seek to provide a precise and comprehensive representation. Rather, we seek to direct the physiological data that we gather to more open-ended uses by striving to make the visualizations spur reflection, build awareness, and open up a space for conversation—for those who participate in our installations, and for ourselves and designers and theorists. This paper thus serves an illustration of how feminist theory could be a point of departure for *problem making and questioning* in design (Forlano et. al, 2016), as well as for feminist theory.

By creating, visualizing, and encouraging reflection on circumscribed datasets, we strive to approach physiological data for its capacity to inspire an alternative epistemological and experiential engagement from either standard scientific visualization or the quantified self. Ours is an object-oriented feminist approach: "in light of a specific and particular materiality to hand, what if we see the world like this?" (Pollock, 2015)[4]

2 Feminist Data Visualizations

This project is aligned with recent calls for feminist data visualization (D'Ignazio and Klein, 2016), even as its starting point is different—engaging not only with representation, but also with *creation and experience of data*.

Our approach toward biological data takes its starting point from the humanistic perspective that troubles the concept of *data* as a *given,* restoring it to its original sense as *taken*—or what Johanna Drucker (2011) characterizes as *capta*: taken and constructed (Drucker, 2011).[5] As Drucker notes, this is a key distinction between natural sciences and humanistic inquiry: "Humanistic inquiry acknowledges the situated, partial, and constitutive character of knowledge production, the recognition that knowledge is constructed, taken, not simply given as a natural representation of preexisting fact" (Drucker 2011). We take this idea further though by collapsing the binary of *given* and *taken*. Our visualizations are created in circumstances that are blatantly artificial and arguably perhaps even arbitrary: installations that provoke physiological response that gauge states that are neither normal (as, for example, 24-hour readings would create) nor optimal (as, for example, while running or engaging in a target activity of rehabilitation). For us, biological data is simultaneously given and taken, a flow of sorts. This idea of flow is relevant both for an understanding of the creation of data mediated by instruments of science, and the experience and interpretation of data mediated by visualizations.

Moreover, we seek to foster open-ended interpretations, and in so doing highlight the indeterminacy of data itself. As Lisa Gitelman and Virginia Jackson (2013, 6) have pointed out, "Data are familiarly 'collected,' 'entered,' 'compiled,' 'stored,' processed,' 'mined,' and 'interpreted.' Less obvious are the ways in which the final term in this sequence – interpretation – haunts its

[4] For further discussion, see Behar (2016).

[5] For more on the constructed and local nature of data see also, Loukissas (2017)

predecessors." We take seriously their point that "data need to be imagined as data to exist and function as such, and the imagination of data entails an interpretive base," (Gitelman and Jackson 2013, 6). In doing so, our visualizations of biological data are designed to *expand* the interpretive base.

The visualizations that our team is creating broadly seek to bring to fore the intra-actions of bodies and environments (Barad, 2017). This builds on Anne Pollock's object-oriented feminist writing on heart feminism, which makes a conceptual argument for considering the heart's receptivity beyond democratic exchange or domination (Pollock, 2015). We build on this evocative argument and employ visual media to ask more capacious questions. More specifically, we use the tools of scientific measurement and digital visualization to explore theory's capacity to open up new avenues for creative exploration. We have found, in turn, that this material engagement opens up new theoretical spaces for feminist theory. In this paper, we present three visualizations. In the first, visualizations foreground embodied responses to emotionally engaging materials such as short videos, challenging the taken for granted duality of affect and viscera (Wilson, 2004). Another explores the experience of time as marked by the beating of the heart, breaking down binaries between objectivity and subjectivity. A third engages how the heartbeat resonates with music, foregrounding the way that the outside world may serve as a starting point for a kind of embodied social connection and resisting the arbitrary boundary of self and other. From a design perspective, these visualizations also serve as a point of reflection on the rhetorical dimensions (Buchanan, 1985; Jun, 2011) of the creation, visualization, and experience of data.

Here, it is also important to note that other artists and designers have engaged biological data in ways that are resonant. While these visualizations are not necessarily explicitly labeled feminist, they have characteristics that are aligned with its ethos. For example, artist Kelly Dobson (2007) has created machines that mimic an individual's heartbeat and other physiological phenomena (such as breathing), foregrounding autonomic connections between ourselves and machines. *Biomorphic Typography* by Diane Gromala (2002) introduces a conception of writing driven by biofeedback, thus enabling users to become aware of their autonomic physiological functions during typing. Other artists have also drawn attention to heartbeat in large public installations. For example, *Pulse Park* is an installation by Rafael Lozano-Hemmer that uses pulse readings of 200 individuals to light up Madison Square Park. According to Lozano-Hemmer, drawing on heartrate is not meant to be medical but rather, "It's meant to bring everyone together, to allow people to express some sort of agency in a public space" (Siegel, 2009). In doing so, Pulse Park directs its audience's attention to the communal dimension of heartbeats, challenging its dominantly individualistic framing. *Heart of the City* by Anaisa Franco is an interactive public art sculpture that is designed for people to sit on it and interact with it with their pulse. The sculpture pulses light according to the heartbeat of the people sitting on it (Franco, 2015). What these visual presentations have in common is that they take biological data as their materials yet present it in ways that challenge its mainstream interpretations.

Creating and expressing data differently is particularly important if we consider how dominant imagery limit imagination and engagement and thus our understanding of phenomena. An example is illustrative here. In an ethnographic study of the London Underground Map—arguably one of the most important communication design achievements of the 20th century—Janet Vertesi asked Londoners to draw a map of London. She noted that they draw maps that look more like the distorted map designed for navigating the tube system as opposed to other features and characteristics of the landscape (Vertesi 2008). In this way, the map limits and confines the imagination about the city: the most important that I need to know is how to traverse it.

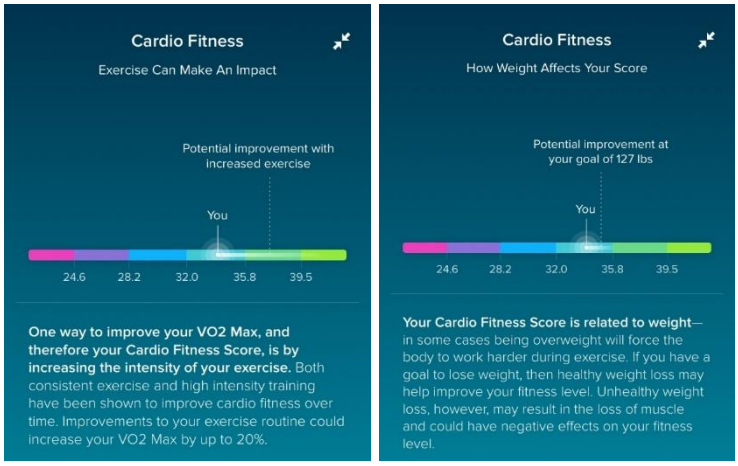

Figure 1. Fitbit Cardio Fitness Screenshots. An Example of how the graphs focus on "improvements" that can be made through exercise and weight loss

In a similar manner, images produced by medical imaging devices and self-tracking tools limit imagination and understanding of our bodies: we are encouraged to see the body in disaggregated bits, and the most important thing that we need to know is how to improve its metrics (See Figure 1). Those who engage with this data are meant to take these images as given. These kinds of renderings are what we are used to, and they dominate our imagination of what heartbeat is and does—and how to attend to it. Whereas in much wearable technology design, "the greater visibility of the bodily information implies an associated responsibility to act, and more specifically to act within intensified regimes of self-improvement and bodily control" (Viseu and Suchman, 163), we seek to create opportunities not to act toward more efficiency and control, as if to save time or to win against time. The experiments described in this paper seek to provide alternative ways of seeing and understanding the heartbeat and biological data more broadly.

2.1 Embodied Emotional Engagement

The first project that is fully realized takes heart rate, galvanic skin response, and breathing as input to produce flower-like visualizations that illustrate physiological responses to a short emotionally engaging video (Figure 2).

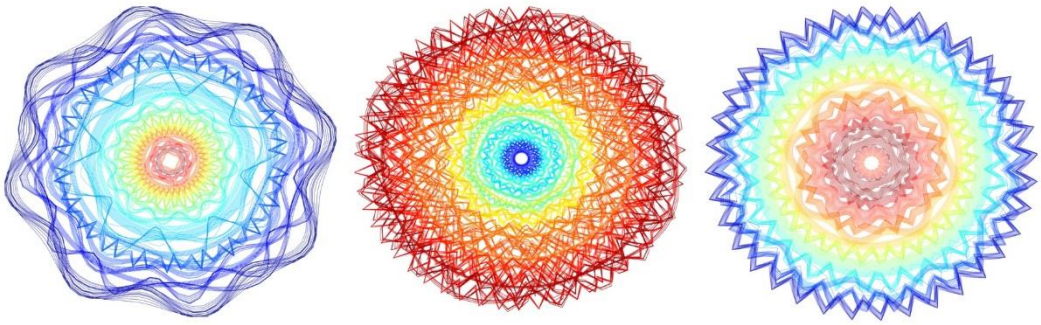

Figure 2. The graph generated for each participant is unique to their experience

Each circular line represents the individual's heart rate, depth of breath, and galvanic skin response at a distinct point in time, with the circles growing outward as time progresses. The quality of the line, that is how smooth or spiky each circular line is, represents how fast the heart is beating. In other words, when the heart beats faster, the graph renders a wave line of higher frequency. The amplitude of the wave line represents how deep the breath is. Shallow breaths produce a shallow wave line while deep breaths are rendered as steeper ones. We also measure the electrical

conductance of the skin, which increases with one's emotional intensity, such as experiencing excitement or fear. The colour intensity changes from blue to red to indicate this variable associated with intensity of emotions (Figure 3). Our choices of color are rather conservative (blue: calm; red: excited). This was the most practical way to render the data, since it was the default spectrum in MATLAB, and we decided that following this established convention makes it easier for our audiences to interpret the data. Moreover, since the drawings are rendered in time, the emphasis is more on the transitions and changes in color as opposed to their absolute values. Participants watch the line of the visualization as it is being drawn over the course of about ten seconds in a way that evokes drawing with a Spirograph toy, and encourages a mindset of wonder and creative exploration rather than assessment and control. We render the x-axis of time in a circular rather than linear way, producing a flower-like drawing that grows with the passage of time. Each drawing is unique to the experience and the individual (Figure 2).

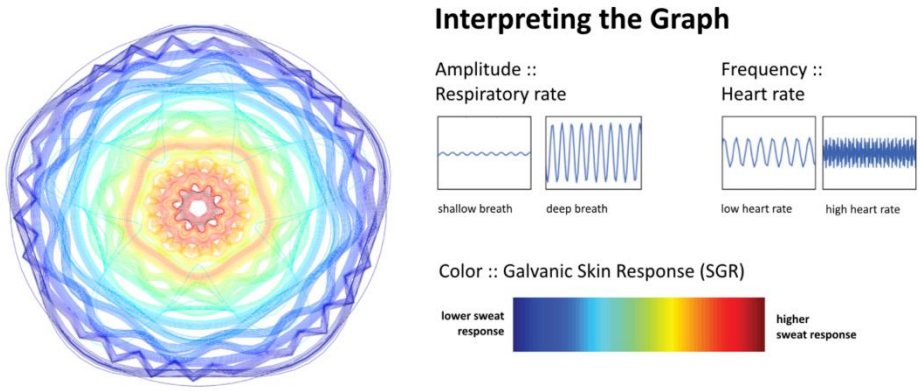

Figure 3. Interpreting the Graph

The way that the installation is set up is this: the viewer sits at a desk in front of a computer that equipped with the sensors. We use a *Xethru* breathing sensor measures the depth of breath by capturing the chest movement. Both heartrate and galvanic skin response are recorded using sensors that the participant wears on their fingers. One of multiple short movies is selected randomly. After they are done viewing the movie, the sensors are removed and the participant is invited to watch the visualization being rendered on a large screen. The final image is also printed on a card that the participant can keep as a souvenir of the experience (Figure 4).

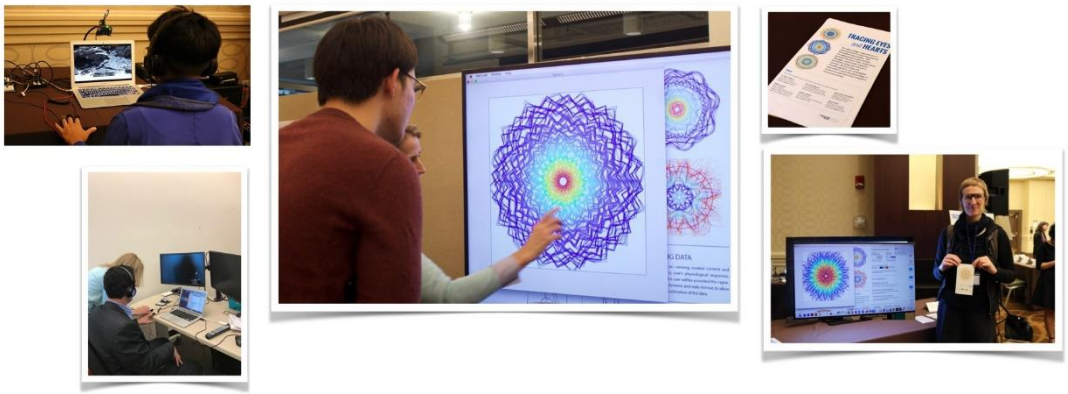

Figure 4. Installation Setup

We showcased this installation at the "Making and Doing" session of the Society for the Social Studies of Science meeting in Boston in August 2017, and the responses that it generated were

extraordinary. People were intrigued by their visualizations—and we say "their" quite consciously People claimed their visualizations in interesting ways. For example, when one of us commented to one participant as her visualization came to completion "wow, that's beautiful," the participant said "thank you." The response was entirely in earnest. Another manifestation of this sentiment was the participants' eagerness to print and "keep" their visualizations. In a few occasions they compared these prints telling stories about what they were experiencing and what the visualization suggested about how they felt.

Whereas data visualization as a field tends to take data about the body for granted, self-tracking discourses tend to take data about the body as a tool of control. This installation, however, manifests one of the ways in which methods and tools drawn from medical imaging and self-tracking devices can be rendered in ways that seek to challenge dominant modes of visualization as a means of optimization—what anthropologist Natasha Dow Schüll (2016, 329) has called "the datafication of biopower," in which the "datafied subject" is constantly nudged to make healthier choices. We were struck by how participants were intrigued by their visualizations as opposed to being confronted with a lack or shortcoming as often happens with self-tracking devices (e.g., "I didn't meet the daily 10,000 step goal last week"). In this manner, the presentation was successful capturing biological data in ways that are whole evocative rather than authoritative.

The other two visualizations are as yet less realized as fully implemented installations but exist as conceptual companions to the above.

2.2 Time

The second experimental configuration engages the experience of time from the heart's perspective. Clock time is set by inorganic means, specifically, the elapsed time of a specified number of cycles of radiation of a Caesium 133 atom. In real life, our time is generally set by our smartphones, which in turn draw their time data from satellites with atomic clocks. But what if we were to use more organic senses of time? What if the heart rather than the Caesium atom could provide a metronome? Could this be a new way of knowing time that takes its starting point from the lives of women and other living things?

Variations in heartrate are of course often due to changes in physical activity, but they can also be due to changes in emotional state. When we are experiencing emotional intensity, our heart rate elevates, and we experience time slowing down. Seconds can feel like minutes, as if we are experiencing life in cinematic slow motion. When we are emotionally disengaged, our heart rate slows down to a baseline, and—unless boredom itself provokes its own state of emotional elevation, aggravation—we become less aware of the passage of time.

In this visualization, we seek to create an opportunity to reflect on the passage of time, as reoriented through attention to the pace of the heart. The animation on the left traces time and heart rate relative to one another while the one on the right keeps track of the numeric value of heart rate. The intensity of the red colour indicates faster heart rate and thus an expanded experience of time. More specifically, on the left we see two lines sweeping the circle. One of the lines represents time just like the "seconds" hand of the clock. The other line, which we refer to as heart time, also sweeps the circles except this one represents heart rate. When time and heart rate get closer together, as would happen in a fleeting neutral state between engagement and disengagement, the colour changes to purple and we also see the two sweeping lines aligned. When heart rate increases, we see the heart rate line falling behind the time one to indicate the appearance of time slowing down. Conversely, when heart rate slows down, we notice heart time speeding up thus indicating that one is experiencing time as if it is going more quickly. In both of these circles, heart time is represented in red, and clock time is represented in blue. In the circle on the left, the relative pace of heart time and clock time moves clockwise, such that sometimes one races ahead of the other. In the circle on the right, when the heartrate exceeds clock time, the number is depicted in red, and when heartrate goes below clock time, the number is depicted in blue.

Figure 5. The image pair on the left shows the state of the visualization when heart time is faster than Caesium time, indicating an experience of time feeling expanded. The image pair on the right shows heart rate line moving below that of the Caesium time, indicating diminished subjective experience of time.

All of the visualizations that we have created engage with temporality, since rates are at the core, but this is the visualization that engages most directly with time itself. Feminist scholarship has recently foregrounded temporality as folded histories (M'Charek, 2014), and temporality as promissory futures (Walker, 2014), but what, after all, is time? Whereas "molecular clocks" of population genetics can fix time and place (Oikkonen, 2017), might a "heart clock" offer something more open-ended? Even as the very assessment of heartrate relies on an x-axis of Caesium-based time, foregrounding the pace of the heart offers gestures toward an ever-emergent organic alternative basis of measure. For both participants in the installation and for ourselves as theorists, we seek to evoke a mode of relationality with the heart's sense of time that is aligned with feminist scientist Evelyn Fox Keller (1983) characterizes—following biologist Barbara McClintock—as "a feeling for the organism." McClintock studied plants, and it is easy to see that plants have a different kind of time and place than humans do. But humans ourselves have plural ways of sensing time. Awareness of diverse human experiences of time can be obscured as our smartphones constantly privilege Caesium time. Bringing heart time to our attention through visualization provides an opportunity to empathetically engage with *ourselves* as organisms, our own pace never quite reducible to Caesium time.

2.3 Embodied Social Engagement

The third visualization engages embodied aspect of social connection through the mediation of the physical environment. Although we are not generally aware of it, our heart rate syncs with our environment. It won't necessarily match the rhythm of loud machines, music, or other stimuli, but its rhythm will come into relation.

Imagine a round table with four chairs and four headphones. A projector positioned on top of a table renders the visualization, which, in the initial state, represents the beat of the music in purple (Figure 6). Participants sit at the table, put on the headphones, and hold a small object that allows their heart rate to be recorded. Each individual heart rate is then rendered in a different colour. Brighter colours such as orange or red signify heart rates that are faster than the beat of the music. Darker colours such as green or blue mark slower heart rates. As each individual's heart rate gets closer to the beat of the music, the colours gradually change to different shades of purple. In this manner, the visualization captures the ways that the heart adapts in tune with the rhythms of space as well as a kind of non-communicative social connection that is otherwise invisible.

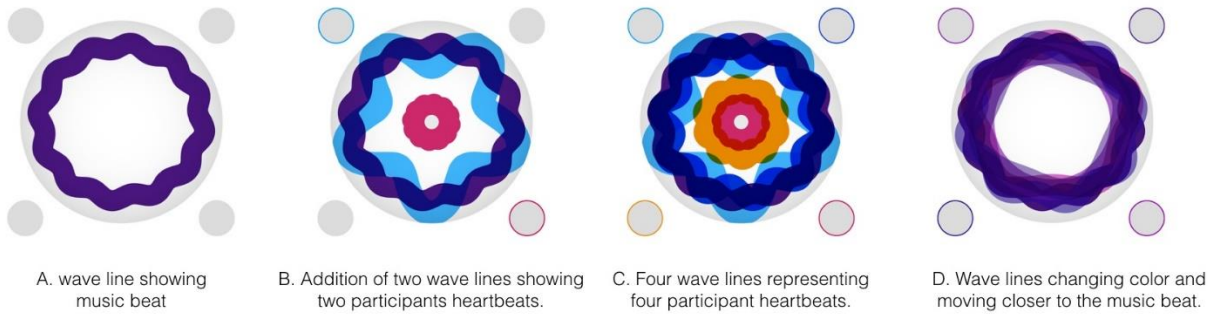

Figure 6. Music Installation

This installation seeks an opportunity to reflect on how "my" heart rate is not merely mine, and that social connection is also physiological connection. In doing so, it foregrounds the arbitrary binaries of inside and outside, self and other, illustrating social and material entanglements. This installation provides a novel route into the classic question raised by Donna Haraway in her Cyborg Manifesto: "Why should our bodies end at the skin, or include at best other beings encapsulated by skin?" (Haraway, 1991: 178). The installation illustrates that our bodies are always already in relation, at the same time that it provokes curiosity about *how* this might be so.

3 Conclusion

To close with a reprise of our opening question: How can the very creation, rendering, and experiencing of biological data be distinctly feminist? Taking heart rate as a point of entry and the above approaches to engaging with biological data gesture toward some ways that we might respond. We seek, for example, to elicit experiences of the body that are not readily available or visible otherwise. These visualizations create and illustrate data produced by instruments of science (cf. Barad, 2017), but prioritize the evocative over the precise in the rendering. These installations gestures toward what feminist STS scholar Angie Willey (2016, 555) has articulated as "biopossibilities," which "seeks to capture conceptually the way our creaturely capacities depend on the constraints of both intelligibility and matter."[6] In this way, our visualizations intervene on prominent non-feminist discourse of data about the body such as the research and discourses around self-tracking.

Our approaches to visualizing physiological data are broadly aligned with the idea of a cyborg feminism (Haraway, 1991), in which neither bodily integrity, nor control over the body, are the goal. While draw on these feminist ethos, however, it is important to caution against a set interpretation of feminist values that unquestionably produce feminist visualizations. We do not see the task of design as *identifying* a set of values to then be *applied* to design problems (JafariNaimi, 2015). Rather, we have *employed* values in feminist theory such as awareness, reflection, and conversation to open up the processes of selection, creation, and visualization of biological data as well as its experiences as generative places for asking new questions, new modes of knowledge making, alternative intra-active engagements. In these engagements, we do not see the biological and the social, or the ontological and the epistemological, as separate—but rather as deeply entangled.

Even as we provide an opportunity for feminist engagement with numerical facts about the body, we do not want to cede too much epistemic authority to those numbers and are careful about making totalizing claims of our own. Thus, a broad goal of this project is to serve as an illustration of how feminist theory allows us a more inclusive definition of science as a postcolonial, queer,

[6] Although part of Willey's argument is that feminists should look to non-data-driven ways of knowing the body, such as the erotic, we believe that our imprecise and expressive engagement with biological data is sympathetic with her approach.

feminist enterprise—as called for by Banu Subramaniam and Angie Willey (2017). We view our contribution as one provisional response to this call and an invitation to future conversation and inquiry in this space by designers and theorists alike.

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Reframing Design Problems Within Women's Health

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This paper begins by offering a feminist reading of the visible increase in design research within the category of "women's health". A critical feminist reading of menstrual cycle tracking technologies is then used to investigate how the way that we frame design problems influences the artifacts produced and their impact within society. I argue that by re-framing design problems from the perspective of third and fourth wave feminism we can develop women's health technologies that are more affirmative, inclusive and which celebrate difference and reflect the complexity around what it means to be a woman in today's society. I illustrate the potential of this reframing by presenting three approaches to the design of menstrual tracking technologies that better adhere to current feminist ideologies.

women's health; design problems; feminism; menstrual cycle tracking technologies

1 Introduction

Women make up half the population and are not a minority. The female body is capable of experiencing more actions, processes and transitions than the male body, such as pregnancy, breastfeeding, menopause, post-partum trauma and menstrual cycles. These physiological processes create many more openings for the application of technology and design than for the male body. As the creation and development of digital artifacts is an act of design (Löwgren & Stolterman, 2004), it becomes relevant to address and critically appraise the design process behind the application of technology to the female body and its particular physiological processes.

According to search results for "women's health" as author-defined keywords in the American Computer Machinery (ACM) Digital Library database, research defined as relating to women's health did not appear until the 1990's and dramatically proliferated from there on, particularly within the last ten years. Currently there are five thousand articles using "women's health" as an author-defined keyword (ACM, 2017). This database holds most major conferences and journals on research into new technologies. The subject of women's health has been an increasingly present topic in workshops and publications presented at international conferences within the fields of human-computer interaction (HCI) and interaction design including two CHI workshops in the last five years dedicated solely to women's health (Balaam, 2013, 2017). Experiences in women's health such as

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breastfeeding have been reimagined through participatory design of breast-pumps (Ignazio, Hope & Churchill, 2016) and Feedfinder (Balaam et al., 2015), a mobile application that facilitates the sharing and reviewing of public places suitable for breast feeding. Research related to menstrual cycles includes the design fiction PeriodShare (Søndergaard & Koefoed, 2016) that uses the taboo around menstruation to address the conventions of privacy around bio-data, and the Menstrual Machine (Ozaki, 2010), a speculative wearable device that simulates the experience of menstruating. The form, aesthetic and functionality of menstrual cycle tracking technologies has previously been discussed within HCI and interaction design in papers such as Epstein *et al.*, 2017.

Feminist HCI and interaction design has also emerged in recent years and there are many parallels and causal links between the two trends. HCI and interaction design have gained an "increasing awareness and accountability for its own social and cultural consequences" (Bardzell & Bardzell, 2011 p.675). Following this, the application of feminist theories has been used within design research in order to reach societal goals such as gender equality. Feminist theories have been used to highlight the influence of the position of the researcher on knowledge produced (Prado, 2014), and to include the marginalized within the design of technologies (Ignazio, Hope & Churchill, 2016).

In this paper, I will apply a collection of western feminist epistemologies to discuss the causes of latency in the research and development of women's health related technologies and possible reasons why and how women's health has become an emergent trend. A critical feminist reading of menstrual cycle tracking technologies is then used to question the implications of how design problems are defined. I then illustrate that a critical stage of analysis when defining what we posit as a design problem can yield innovative, affirmative and feminist design artifacts that celebrate difference and inclusivity.

2 "Women's Health" as an Emergent Trend

2.1 Why Did It Take So Long?

One way of grounding causes for latency in the development of technologies for women's health could be through the concept of the "othering" of women that is widely used and discussed within feminist theory. The term "othering" comes from Simone de Beauvoir's statement "He is the Subject, he is the Absolute, she is the Other" (1949). With this statement Beauvoir claims the view the world holds prioritizes the experiences of men. This is extended by Rosemary Garland-Thompson's definition of the norm, or "normate", as the white, young, healthy, heterosexual North American man (1997). Women are categorized alongside the remaining population including people from other races, sexual orientations and people with disabilities. These outlying groups are deemed abnormal or "extraordinary" (Ibid). A similar search for "men's health" in author defined key words in the ACM Digital Library returned only one result. However, if we follow Beauvoir and Garland Thompson then it could be said that a search of the ACM digital library for the keyword "health" would return research that were androcentric, this term refers to the prioritising of male experience over female experience that results in the marginalization and subjugation of women. These "health" technologies would therefore hold a biased towards male experience from the ideation phase to the methods applied in user research. Epstein et al. (2017), describe how when Apple launched their Healthkit app in 2014 they excluded menstrual cycle tracking from the features it provided, only adding it later following a public outcry. This case highlights assumptions held within the development of technologies about the body of the user. If the male body represents the norm, then an intentional effort is then required to design specifically for the female body. This directed effort could even be labelled as a separatist act, where men are excluded from the design process and discourse. As stated in Bardzell, 2010, a separatist act goes against the "universalizing aspirations" of technology where technological artifacts should be relevant and useable by all, regardless of sex, gender and culture.

2.2 Why and How Women's Health Became an Emergent Trend

The question of why and how women's health has become an emergent trend can be answered through the use of particular feminist theories on scientific research. I will now propose that an increase and improvement of research on women's health within design fields can be seen to be evidence of the application of the epistemologies of feminist empiricism, feminist standpoint theory and the use of feminist design methodologies. This analysis brings to light the role that feminism has played in driving change up to this point. This allows reflection on the current status quo and makes visible the work that is still to be done within design research in order to work towards feminist goals within society.

2.2.1 Feminist Empiricism

Feminist theorist and scientist Sandra Harding outlines existing feminist epistemologies that aim to correct androcentric methods and cultures within scientific research (1986). I will apply these epistemologies, or perspectives on the production of knowledge, to design. The first perspective Harding presents, feminist empiricism, "argues that sexism and androcentrism are social biases correctable by stricter adherence to the existing methodological norms of scientific enquiry" (Ibid, p.24). Applied to the fields of design, feminist empiricism holds that androcentrism and sexism could be correctable through an increase in the diversity of those working within the field. Therefore, an increase in research on women's health could be due to social movements such as women's liberation that have resulted in more women taking up jobs as designers and researchers. Feminist theorist Sara Ahmed (2006) uses the term "orientations" to discuss the fact that our perception of the world is influenced by "what we can face at any given moment in time." (Ibid, p. 547). For female designers, the female body is present to them in different ways than to male designers. Female designers therefore may feel motivated to attend to the female body through the design of women's health-related technologies. Bardzell (2010) describes the increase in inclusivity within HCI and interaction design as evidence of pluralism. Pluralism is the opposite to universalism and "embrac(es) the margins both to be more inclusive and to benefit from the marginal as resources for design solutions" (Ibid, p.1306). It could therefore be argued that designers as a population have becoming increasingly gender diverse, and this has allowed for the development of non-universalising technologies specifically designed for women's health.

2.2.2 Feminist Standpoint Theory

The second perspective outlined by Sandra Harding is feminist standpoint theory. This theory recognises that knowledge is constructed, not found (Harding 1986), and that the location and perspective of the researcher will influence the qualities of knowledge produced. From this perspective, an increase in research carried out by female designers can therefore be posited as producing a higher quality of research on women's health. Rather than leading to essentialism by stating that men are disqualified in the design of technologies for women's health, this epistemology celebrates the situated knowledges (Haraway, 2006) of female researchers in developing technologies for women's health that better suit women and the female body. An example of the application of standpoint theory and situated knowledges is the project FemSpec (Rossman, 2008). FemSpec re-imagines the design of the speculum, which was historically designed from a dominant medical and masculine position without consideration for the comfort of the female patient. The company behind FemSpec, FemSuite, is comprised of one male and two female gynaecologists. FemSuite utilized their own personal experiences as well as the experiences of female research participants to design an improved speculum that, through a process of participatory design and subjective experiences, improved the experience of cervical examinations that are a vital aspect of women's health.

2.2.3 Feminist Methods of Enquiry

Feminist methods of enquiry can be seen to have improved research on women's health through the application of feminist research methodologies and methods. Although the increase and improvement of research on women's health within HCI and interaction design can be seen to be

evidence of feminist empiricism and feminist standpoint theory epistemologies, Harding critiques both epistemologies by stating that neither change the "existing methodological norms of scientific inquiry" (1986), p.24). Donna Haraway's analysis of the influence of the researcher's own lens of dominance evident in methodologies and methods used within a primate study in the 1930s (2006) reveals the "embodiment of social relations in the content and basic procedures of a natural science in such a way as to expose the fallacies of the claim to objectivity" (Ibid, p.12). Within design research, it has been shown that certain methodologies can support feminism through their ability to expose the influence of the researchers own lens of bias and privilege on knowledge produced (Søndergaard & Koefoed, 2017). Ignazio, Hope and Churchill (2016) and Prado (2014) have proposed that methodologies such as participatory design and critical and speculative design offer feminist tools that include women as a marginalised group in the design process and imagine alternative futures in order to reject the reification of existing biases within society. Bardzell (2010), offers a "set of feminist interaction design qualities intended to support design and evaluation processes directly as they unfold" (Ibid, p.1301). Bardzell proposes that the application of qualities such as *advocacy, ecology, embodiment, participation and self-disclosure* can yield a generative approach to feminist HCI and interaction design. These feminist methods of enquiry can be seen to combat androcentrism through *how* research is conducted. These examples provide roadmaps for those wishing to conduct feminist research and can be seen to have improved research on women's health through the questioning of "existing methodological norms of scientific inquiry" (Harding, 1986, p.24).

3 Menstrual Cycles as a Design Problem

As argued above, feminist empiricism, feminist standpoint theory and a range of feminist design methodologies are apparent causes behind the increase and improvement of research on technologies for women's health. However, Sandra Harding discusses how androcentrism often lies in the defining of the problem area where the research will take place; "a key origin of androcentric bias can be found in the selection of problems for enquiry, and in the definition of what is problematic about these phenomena" (1986, p.25).

How design problems are conceived and considered within design theory has changed drastically over the decades. In the 1950s and 1960s first generations of design theorists and practitioners "viewed design as a process of systematic problem solving" where the designer was an "objective, scientifically trained expert" (Löwgren & Stolterman 2004, p.154). Later generations rejected the perspective that there are pre-existing problems to be solved by designers through rational and objective dissemination and thought, and instead acknowledged that it is the designer themselves who create and define design problems.

> *Design problems are "indeterminate" and "wicked" because design has no special subject matter of its own apart from what a designer conceives it to be… in the process of application, the designer must discover or invent a particular subject out of the problems and issues of specific circumstances. (Buchanan, 1992, p.16).*

If we follow the fact that design problems are solely conceived of by the designer, then this highlights the influence of the individual designer's social and cultural positions and beliefs and politics on the resulting artefacts of the design process. Through using menstrual cycle tracking technologies as an example, I now propose that androcentrism can still be seen to be evident in how design problems are framed within the development of technologies for women's health.

4 Menstrual Cycle Tracking as Biopower

Menstrual cycle tracking is not a new phenomenon; women have tracked their menstrual cycles through analogue methods for centuries. Though the digitisation of menstrual cycle tracking technologies allows new functions and possibilities, current technologies still closely resemble analogue tools. The key differences between digital and analogue tools is that digital tools are screen based, interactive, provide apparently scientific information about each phase of the menstrual

cycles and that they can predict the timing of the menstrual cycle through the use of algorithms and data-gathering. If menstrual cycles have historically been used as an argument for the subjugation of women (Shildrick, 1998), and analogue menstrual cycle tracking tools work towards the concealment of menstrual cycles in society (Bobel, 2010), then it can be seen that menstrual cycle tracking technologies that closely resemble their analogue forebears, are designed as solutions to the same longstanding problem of the uncontrolled and objectionable female body.

Epstein et al. state "women often track their menstrual cycles without an explicit goal of action, but instead for awareness of their place in their menstrual cycle." (2017: 6876). It could be argued, however, that "awareness" is a goal in itself, not only for the individual but also for society. It has been discussed that there is a wider societal goal behind self-tracking that relates to Foucault's concept of biopower (Leder, 2016; Lupton, 2016; Schüll, 2016). The term biopower refers to the promotion of the practice of self-discipline on an individual scale as a tool to govern the population (Foucault, 1990). In the context of biopower, self-tracking technologies provide us with the tools to monitor and discipline our bodies, as the uncontrolled body, such as an overweight, ill or erratic body that is seen to place economic burden on the wider society is viewed as undesirable and uneconomical (Lupton, 2016, p.52).

Historically, the female body has been considered to be uncontrolled. This has been used as an argument for the subjugation of women;

> *for women losing control is only to be expected. Though past explanations, such as the concept of the wandering womb, have been superseded by new constructions of female disorder, sophisticated medical references to hormones, pre-menstrual tension, menopausal irritability and the like are no less rooted in an essentialist view of women's bodies and women's nature." (Shildrick, 1998, p. 27).*

In light of this, it could be said that menstrual cycle tracking technologies represent tools of biopower used to control and mitigate the symptoms of the menstrual cycle in order to allow the female, menstruating body to perform in society as a non-menstruating body, male, body. Although not all female bodies menstruate, for example pre-pubescent girls, trans-women or post-menopausal women, generally the societal understanding of the non-menstruating body is the male body. A non-menstruating body can therefore be seen to be the desirable and "normate" (Thomson, 1997) body within an androcentric society, where the male body is valued above all others.

5 Androcentrism Evident in Menstrual Cycle Tracking

I will now present evidence that menstrual cycle tracking technologies re-enact androcentric ideals throughout three key phases of the menstrual cycle.

5.1.1 Menstruation

One key motivation for many users of menstrual cycle tracking technologies is being able to predict the onset of menstruation (Epstein et al., 2017). This is in order to ensuring that they are prepared with the appropriate tools such as tampons, sanitary towels or menstrual cups to prevent menstrual blood seeping through their clothes and being visible by others or transferring onto furniture. Menstrual blood is currently considered taboo in many societies and cultures across the world, and a backlash against these taboos has been the Free Bleeding movement what gained popularity in Western societies in 2014 when Kiran Gandhi ran the London Marathon with her menstrual blood visibly flowing through her clothes (Gandhi, 2015). Free Bleeders take pride in the visibility of menstrual blood, often using social media as a platform to share images and videos of themselves. The concealment of menstrual blood can be seen to be the concealment of female embodiment in favour of a non-menstruating, controlled, male embodiment.

5.1.2 Ovulation

The expectation for the menstrual cycle to be controlled by individuals is also motivated by the fact that the ovulation phase of the menstrual cycle dictates the body's fertility. Most forms of contraceptives, such as hormonal contraceptives and IUDs, are still designed to be used by the female body, with the exception of condoms. Menstrual cycle tracking has long been used as a form of fertility managements, particularly within certain religions such as Catholicism. Advancements in technology and data science have resulted in the development of algorithms and digital temperature tracking technologies that now mean that menstrual cycle tracking apps can be marketed as a secure form of contraception. The Natural Cycles Bluetooth enabled thermometer and accompanying app gained FDA approval in 2017 (Berglund-Scherwitzl et al., 2015). This product heralds a whole new future of contraceptive technologies. Deborah Lupton's review (Lupton, 2015) of sexual and reproductive self-tracking apps found that apps on the subject of sex and fertility designed for women focused on medicalisation and risk of disease and pregnancy. For men, these apps were designed with an emphasis on physical performance, duration and competition. For the individual woman to be able to control their own fertility and reduce unwanted pregnancies is clearly beneficial for the wider society economically. Fertility management as biopower is therefore seen to be designated to women through the use of menstrual cycle tracking technologies.

5.1.3 Pre-Menstrual Syndrome

A third aspect of the menstrual cycle that can be seen to be controlled through menstrual cycle tracking is pre-menstrual syndrome (PMS). PMS is commonly defined by symptoms such as irritability, tender breasts and bloating and occurs around a week before menstruation. Though the existence of PMS is contested in certain areas of scientific research (Romans et al., 2012), PMS is an accepted phase of the menstrual cycle in societal discourse. Most menstrual cycle tracking apps include some form of PMS logging tools and use this to predict when PMS will occur in future cycles. Epstein et al.'s study (2017) found that menstrual cycle tracking allows users to understand, and sometimes mitigate, their own emotions. As one of participant in their study stated "sometimes I'm really emotional and irrational and I can look at my tracker, see that my period is due in a week or less and chill out and realize I'm PMSing instead of having real feelings." (ibid, p.6879). The labelling of emotions experienced during PMS as un-"real" relates to a common theme in societal discourse where PMS is represented as a phenomena that takes over the body and renders it altered from its "real" state and thus uncontrolled and devoid of rationality.

The Testy Totem app (Testy Totem, 2017) is designed for "husbands/boyfriends/partners whose significant other exhibits PMS, or moodiness associated with their menstrual cycle." The app asks the user to input details of the menstrual cycle it would like to track, such as average length and the beginning of menstruation in order to synchronise with it. Red, green and yellow images of Totem's with varying facial expressions then indicate which stage of the menstrual cycle the person they are tracking is in. "Green means everything is normal, the time of the month two weeks or more away. Yellow indicates that you or your totem is within two weeks of their menstrual cycle, and Red means you or your partner is one week from starting menstruation, the phase of the cycle most commonly associates with PMS or Pre-Menstrual Syndrome". The term "normal" to represent the non-PMS stage of the menstrual cycle labels the PMS-ing body as being ab-"normal", just as their PMS-ing body was un-"real" for Epstein et al.'s participant. Whether this technology is designed for the benefit of both the user and the partner being tracked is doubtful. Testy Totem does not appear to be designed as a collaborative tracking tool such Clue Connect that lets the user track their own menstrual cycle share their data with others (Clue, 2016). Theoretically the Testy Totem could be used without the consent or knowledge of the partner, thus representing a technology for un-consensual surveillance. The design, function and language used by Testy Totem gives a clear indication of how PMS and women experiencing PMS are perceived by the designer(s), predominantly as a negative phenomenon which requires management. Though the description does not explicitly say what the goal of the app is, the in-app explanation advises the user to "BE ON

YOUR TOES" and "KEEP YOUR MOUTH SHUT" when the cycle that they are tracking is in the PMS phase. It therefore appears that the app is designed for users to be able to adapt their behaviour according to their partner's menstrual cycle, therefore controlling the influence the menstrual cycle of their partner has on their relationship. This relates to the direction that Epstein et al.'s participant gave to themselves to "chill out" once they are aware that their behaviour is due to PMS, thereby encouraging them to mitigate their own behaviour for the sake of others in society through the concealment of PMS and enacting a non-menstruating body instead.

6 A Feminist Re-framing of the Design Problem of Menstrual Cycles

Here I will return to Harding's statement "A key origin of androcentric bias can be found in the selection of problems for enquiry, and in the definition of what is problematic about these phenomena" (1986, p.25). In avoiding androcentrism in the framing of menstrual cycles as a design problem, designers must aim to find a feminist alternative. As will be discussed below, after a brief presentation of conceptualisations of menstrual cycles in second and third and fourth-wave feminism, this can be a complex but generative task.

Androcentrism is not the sole possible framing relevant to menstrual cycle tracking technologies. Menstrual cycle tracking technologies can also be seen to be in accordance with the ideologies of early second-wave feminism. During this movement in the 1960s, women were encouraged to transcend their embodiment in order to reach political and public equality with men (Beauvoir 1948). For second-wave feminist theorist Shulamith Firestone (1971), gender equality would require the introduction of extra-uterine gestation that would relieve women of the burden of child-bearing. The goal for second-wave feminism was equality in all areas of work, family life and in public through eradicating the female gender and all its qualities entirely. Evidence of this can be seen through the introduction of tampons, that allowed women to conceal their menstrual blood entirely, and how The Pill was manipulated by women to skip the pause that allows menstruation that is built into the monthly prescription (Bobel, 2010). However, this ideological dream was later criticised by a large part of feminists as it implied that the "true potential" that could be reached through transcending the female body was the male body, thereby re-enacting androcentric bias in society.

The current, fourth-wave of feminism is still being shaped, but is grounded heavily in third-wave feminism, which emerged in the 1990s and is a notoriously difficult to define due to its emphasis on inclusion and non-boundary feminism (Snyder, 1995). Themes running through third-wave feminism are intersectionality; a result of a critique of feminist standpoint theory's universalizing labelling of "women" as one group. Intersectional feminism posits that all categories of race, class and sexuality must also be taken into account when considering the subjugated situations of women. As Claire Snyder writes; "By occupying female subject positions in innovative or contradictory ways, third-wavers unsettle essentialist narratives about dominant men and passive women and shape new identities within the interstices of competing narratives. There is no one way to be a woman." (1995 p.185). The emphasis on inclusion and choice of the individual at the core of third-wave feminism means that it is equally as feminist for women to choose to conceal their menstrual cycles, aligning themselves to the second-wave ideology of transcending their biology, or for women to bleed freely in public and choose not to adhere to societal taboos through discussing and displaying their menstrual cycles with pride (Bobel, 2010). This means, therefore, that there is not one clear, feminist framing of menstrual cycles as a design problem, though choice and inclusion are clear elements which distinguish feminist design problems from androcentrically biased design problems within this context. What will be presented now are three illustrations of future designs of menstrual cycle tracking technologies that can result from the re-framing of menstrual cycles as design problems that adhere to current feminist ideologies whilst continuing to reject androcentric ideals and the subjugation of women.

7 Sharing the labour of fertility tracking

By framing menstrual cycle tracking as a design problem that acknowledges that conception involves both men and women, fertility can be re-framed as a shared responsibility. As shown in Deborah Lupton's analysis of sex and fertility apps (Lupton, 2015), the majority of current apps designate the responsibility of fertility management to women. One example of menstrual cycle tracking technologies that share the labour of fertility tracking could be technologies that notifiy both partners when ovulation is imminient. This allows both partners to either plan or avoid sexual intercourse during this time without the female partner acting as gatekeeper to their own bodies by permitting or rejecting sexual intercourse. As discussed above, apps such as Clue already offer users the opportunity to share their menstrual cycle data with others. This development allows users to share their menstrual cycle data with their partners, friends and family and was "the most requested feature since we initially launched Clue back in 2013." (Clue, 2016). In contrast to the example of Testy Totem (2017), also presented above, where the surveillance of the menstrual cycle was non-consensual, users of Clue Connect have sole access until they invite people to share their data and can block this access at any time. The fact that this was "the most requested feature" shows that this is a facility that is appreciated by those that use menstrual cycle tracking technologies and points to further design work that could be done in this area. A related design example that addresses gender equality in fertility control is (Homewood & Heyer, 2017), where speculative design is used to imagine the impact on future users of the contraceptive microchip implant that will be released onto the market in the next few years. The contraceptive microchip implant lasts for sixteen-years and is accompanied by a remote-control component that enables users to control the flow of contraceptive hormones into the user's bloodstream in order to permit or prevent conception. Within this project, the remote-control component was imagined as two necklaces, one necklace to be worn by each partner. When fitted together, these necklaces could disable the microchip implant and therefore allow conception. This imagining of the remote-control component proposed a more collaborative and mutual control of contraceptive methods through use of ritual. Both Clue Connect and the speculative remote-control component can be seen to reflect current feminist ideologies that reject the designation of labour around pregnancy and childcare solely to women through the sharing of the labour surrounding fertility tracking and fertility control.

8 Alternative Representations of Menstrual Cycle Data

The majority of current menstrual cycle tracking technologies are in the form of apps. These apps are available to users on their smart phones and are mostly kept private. In order to investigate conceptions of privacy around menstrual cycle tracking data, Søndergaard and Koefoed (2016) created PeriodShare, a design fiction of a connected menstrual cup that measures how much the user menstruates and posts this information to social media. This design fiction rejects societal taboos around menstruation in order to question what the form of representation of menstrual cycle data says about our relationship with the menstruating body in society. As shown by PeriodShare, through rejecting the concealment of menstrual cycles by visualising menstrual cycles data in public and visible ways, it could be possible to invert the taboo surrounding the subject of menstrual cycles in order to ask questions about how the menstruating body is viewed in society. In a society where there were no taboos or acts of concealment surrounding menstrual cycles, a multitude of design openings would present themselves; homes, clothing and public environments could be re-imagined to adapt to the changing body over the menstrual cycle. This could lead to a new wave of technologies that change with us and reflect the unstable nature of the female, and male, body. These technologies could hold inconceivable benefits for us and our relationships with technologies. As there is no one way to be a woman, all of these technologies would be customisable to how publicly visible user wish their menstrual cycle data to be. Menstrual cycle data could be abstracted to become unreadable to others, or represented more literally to give clear signals to those around them. To sum up, through considering menstrual cycles minus the surrounding taboo as a design problem, more innovative and feminist menstrual cycle tracking

technologies could be constructed that may benefit women, and men, in our everyday lives and in our interactions with technology.

9 Re-Defining Normal

All aspects of menstrual cycle tracking technologies, from the algorithms used to make predictions, to the information given at every phase of the menstrual cycle, is built upon a framing of menstrual cycles as a design problem that conceptualises the "normal" menstrual cycle as regular. This means that many women, especially those with conditions such as Polycystic ovary syndrome (PCOS), are not able to use current menstrual cycle tracking technologies as they do not have regular menstrual cycles. This clear exclusion of a whole group of women can be said to work against the inclusive ideologies of third-wave and fourth wave feminism. There is therefore much work to be done in the development of menstrual cycle tracking technologies that do not rely on a regular, "normal", menstruating body, and are more suited to the subjective experience of every menstrual cycle and are customisable as such. This can be done by considering irregular rather than regular, subjectively experienced menstrual cycles as design problems.

Another re-framing of menstrual cycles in relation to what is considered "normal" is the delinking of gender from menstruation. Trans men who do not identify as female also menstruate. Menstrual cycle tracking apps have been shown to use gendered aesthetics and terminology that assumes that the user identifies as female (Lupton, 2015; Epstein et al., 2017). These apps re-enforce gender assumptions in society and exclude those who do not equate menstruating with being female. For trans men, menstruation can bring gender dysphoria and is often avoided by the use of synthetic hormones (Williams, Weinberg & Rosenberger, 2013). Through re-framing menstrual cycles as non-gendered physiological process, more inclusive menstrual cycle tracking technologies could be developed that no longer link menstruation with identifying as female. There may also be promising design openings to follow through addressing the emotional impact of the onset of menstruation for trans men. These technologies might help to avoid gender dysphoria and distress experienced.

Through rejecting the framing of menstrual cycles as design problems that assume that there is a "normal" menstruating body, menstrual cycle tracking technologies can be designed to include a wider range of people who menstruate. This will prevent the exclusion and pathologization of the irregular or non-gendered menstruating body and thus fulfil the inclusive and diverse ideologies of third and fourth-wave feminism.

10 Conclusion

This paper has used particular western feminist theories to reason the increase and improvement of "women's health" in design research and HCI. As Harding (1986) stated, androcentrism often lies in how a design problem is defined. Therefore, in further pursuing feminist goals within design, it becomes relevant to address androcentrism within the definition of design problems. Since design problems are defined by designers (Buchanan, 1992, p.16), designers can choose to either re-enact or challenge prejudices and inequalities in society through how they (we) frame aspects of the world around us. Were designers to choose to reject androcentrism in their framing of design problems, then a feminist framing can be applied. This paper has proposed that the complexities of third-wave, and consequently fourth-wave, feminism can be seen as generative to a design process. In current feminism dicourse there is not one category of women, there are many, and there is no one way to *be* a woman. Feminist technologies designed for women's health must reflect that. A feminist re-framing of menstrual cycles as a design problem is illustrated through three examples of menstrual cycle tracking technologies that celebrate difference, inclusiveness and complexity around what it means to be a woman in today's society.

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Formgiving to Feminist Futures as Design Activism

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Design activism is the enforcement of positive socio-political change by intervening in daily lives. In this paper, we argue that 'formgiving' to futures--design interventions such as physical objects, embodied experiences, and affective engagements--is an activist practice with the unique qualities of engaging participants and facilitating the co-creation of alternatives. Central to our exploration is the question of how to participate in the work of generating new ways of conceptualizing, materializing, and experiencing alternative futures. Drawing on feminist theory and, in particular, its profound commitment to social justice, we discuss three core dimensions that are relevant to the practice of 'formgiving' to futures in design: temporalities, subjectivities, and hack-abilities.

design activism, feminism, futures, social justice

1 Introduction

In recent years, designers have become more aware of the ethics, values, responsibilities and social impacts of their work. This increased interest is illustrated by the growing number of socially-concerned design competitions, the creation of social innovation programs in design departments, and the organization of thematic conferences such as the annual conference of the Design History Society, which focused on Design Activism and Social Change in 2012. According to Will Bradley and Charles Esche (2007), design visionaries are often concerned with social and cultural implications of their work. From William Morris's opposition to industrialization to Walter Gropius's establishment of the utopian pedagogy of the Bauhaus, designers have always imagined better futures for all. However, the meaningful participation of designers in socio-political change cannot be taken for granted and has not remained constant over the last hundred years. In the second half of the 20th century, following the modernist qualities of rationalism, universalism, and individualism (Heller & Vienne, 2003), designers in the United States created process-oriented design programs that decontextualized the work of design, preventing them from dealing with the social and cultural implications of their time. For example, during the 1960s in the context of political turmoil around the Vietnam War, according to an account by Katherine McCoy, a design student in the 1960's:

> *We [designers] were encouraged to wear white lab coats, perhaps so the messy external environment would not contaminate our surgically clean detachment. These white lab coats make an excellent metaphor for the apolitical designer, cherishing the myth of*

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> *universal, value-free design-that design is clinical process akin to chemistry, scientifically pure and neutral, conducted in a sterile laboratory environment with precisely predictable results* (Heller & Vienne, 2003).

Design methods and processes were created to help designers to "objectively" understand user needs so that they could construct preferred situations and solutions without taking their own subjective experiences and biases into consideration. However, this also led designers to distance themselves from ethical and political values, which resulted in a disengaged design culture. In addition, the field of design embedded modernist and patriarchal values, which include the Western, Enlightenment era dualistic structures of man and woman, human and non-human, and nature and culture. As such, these values have shaped with ways in which designers create 'preferred' futures in which one side is privileged over the other. In this paper, we argue that the dominant modes of design knowledge and frameworks, which often reify these dualistic structures, are incapable of envisioning 'preferred' situations towards more socially just futures. Here, feminist theory has the potential to expand the scope of design activism around the practice of formgiving to alternative futures.

2 Design Activism

Design activism refers to "design thinking, imagination and practice applied knowingly or unknowingly to create a counter-narrative aimed at generating and balancing positive social, institutional, environmental and economic change" (Fuad-Luke, 2009, p. 27). In other words, design activism aims to use an intervention in order to generate change in the system. This politically-motivated practice broadly overlaps with social design, community design, participatory design, and critical design. (Julier, 2013).

Inspired by collaborative and action-based design activism in Nordic countries (Clarke, 2013), Papanek's *Design for The Real World*, published in 1971 was one of the first seminal books concerned with the implications of design for people and the planet. In the past several decades, these concerns have become more urgent with the rapid rise of global challenges including climate change, economic recession, migration crisis, and increased nationalism.

Given this, it is important to understand the unique qualities of design activism that distinguish it from closely related political and art activism. Specifically, the generative nature of design raises the question of how design activists engage in criticizing dominant power relations while at the same time affirming the dominant politics through their design contributions. Although, activists in all domains face this paradox (Braidotti, 2010), it is particularly relevant in the context of design in which activist artifacts communicate political statements in the context of the everyday practices. Both Fuad-Luke (2009) and Markussen (2013) draw attention to the aesthetic quality of design activism as an effective approach in connecting activist messages to people's emotions. Design activism has a wide range of forms and, as such, it is a flexible medium for activism. It can extend the demonstration of concerns to the realm of everyday life, from public spaces and publicity to 'things' and systems (Lees-Maffei, 2012). Marenko (2015) points to mobilizing underused assets and activating what's immanent in the environment as a way in which design activism creates spaces of alternative relations. According to Svirsky (2010), activism, in general, creates a new space of relations to accentuate social and political practices, beliefs, and systems. These spaces of alternative relations are created through the combination of 'actualised world' and 'new imaginations.' Designerly interventions have the distinguishing quality of merging these two separate spheres for the creation of alternatives. This quality, which has been framed as 'intensification' (Julier, 2013), integrates both political statements and human emotions and increases factual and empathic awareness to alter status quo.

3 Formgiving to Alternative Futures as a Mode of Design Activism

Design is inherently about futures. Designers determine courses of action, and materialize them, to change the status quo. According to Margolin, "to plan effectively in the present requires a vision of what the future could and should be," (2007). While ideas about possible futures are internal representations in the mind, designers externalize those ideas and give them a coherent representation. These external representations, communicate ideas about the future with others thereby increasing awareness and understanding about possible futures across a wider audience. This is what we mean by 'formgiving' to futures, the process by which designers use a diverse communicative repertoire including two-dimensional visual representations, physical objects, spatial forms, interactive workshops, affective interfaces, and embodied experiences. Rather than merely educating people about future possibilities, this practice invites them to create and experience alternative futures.

According to Levitas, there are three interrelated modes for constructing ideas about the future: 'archaeological,' 'ontological,' and 'architectural' (2013). First, the archaeological mode embeds ideas from today's political, social, and economic systems. Second, the ontological mode addresses human nature and related values. Third, the architectural mode, which we have adopted in this paper, is "the imagination of potential alternative scenarios for the future" (Levitas, 2013, p. 153). Along these lines, Fallman (2008) argues that there are three activities that establish design research, one of which is 'design exploration'. Design exploration is aligned with the architectural mode in that it specifically engages with imagined futures. Design exploration includes practices such as speculative design, design fiction, and scenario building, which attempt to show alternatives to hegemonic social orders through a provocative or critical intervention.

Ideas about the future have been the source of inspiration for technological inventions, cultural advancements, and political discourses in modern society. These socio-material representations give us a grasp of what futures could look like. According to Dator, ideas about the future determine how we live in the present, and this is the basis of the field of futures studies (Dator, 1995). By distancing ourselves from the present, they allow us better comprehend the dynamics of the system so we can calibrate the actions that we might take in the present to get there. Nevertheless, as Schalk et al. remind us "design does not fully determine everyday practices," and, instead, ideas of the future are in constant negotiation with socio-material practices (2017, p. 285).

The graph below [Figure 1] demonstrates the interaction between ideas about the future and our present actions. Ideas about the future are shaped by elites and expert scientific communities; for example, by politicians and their campaign promises, and artists and cultural producers who are expressing their feelings in creative formats such as science fiction novels, etc. Although ideas about the future are not applicable for immediate action, they inform us and create a culture of thought that gradually impacts our current practices and social orders. In other words, through the construction of everyday practices, the practice of formgiving to alternative futures could destabilize dominant power relations.

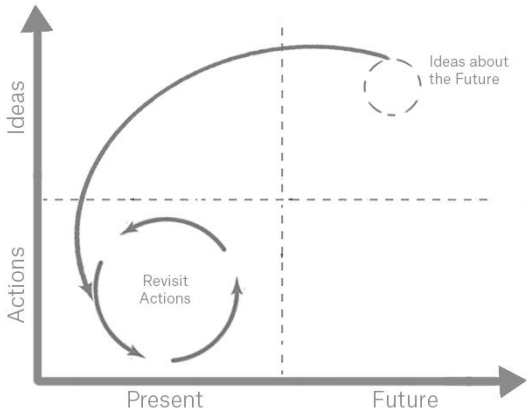

Figure 1: Ideas about possible futures inform us and impact our immediate actions

The importance of shaping alternative futures has always been vivid for social activists. For example, in 2017, the Design Justice Network suggested ten steps for designers and design studios that support more socially just practices in design workplaces, processes, and products. One of these steps is to 'shape alternative futures':

> *This work must not just be about resisting injustice, but also giving shape to what is possible. Work with community organizers and social justice advocates who are imagining more just worlds. Share these visions in poster form, as icons, as open source blueprints, zines, community-based architectural structures, accessible products, murals, collaborative workshop outlines, tools for addressing environmental issues, information based installations, interactive media and any other ways that contribute to feeding our social imaginations* (Costanza-Chock, 2017, pp. 11-12).

However, we should not forget that using design to envision 'preferable' futures might also be dangerous; designers may reinforce widespread systematic biases in selecting particular alternatives over others and, in doing so, replicate existing social inequalities. According to Latour (2008) "[design] is never a process that begins from scratch: to design is always to redesign." In a recent book, Redström discusses the role of design programs in creating "alternative nows," adding that design research should be understood "as a matter of making difference rather than as change." He also comments on the ways in which making futures might in fact prevent others from participating in the shaping of futures. Similarly, Mazé (2014) considers preferring one future over another as an explicit social and political matter. The challenge of reinforcing biases through design solutions has long been the concern for design scholars including Fry who writes:

> *We need to remind ourselves that the future is never empty, never a blank space to be filled with the output of human activity. It is already colonised by what the past and present have sent to it. Without the comprehension, without an understanding of what is finite what limits reign and what directions are already set in place, we have little knowledge of futures, either of those we need to destroy or those we need to create (Fry, 1999).*

Although formgiving to alternative futures is not a radical departure from current design activism, there is currently no strong infrastructure or body of theory to connect disparate practices and engage design scholars and practitioners in future making. In this paper, we propose that feminist theory, with its central commitment to social justice, is a natural ally for design activism.

4 Feminism and Social Justice

Feminism is a domain of critical theory that reveals the aspects of our culture that reinforce patriarchy, colonialism, and capitalist ideology and, in addition, it recognizes the absence of voices in

the dominant cultural norms as a call to action toward social justice. A commitment to feminism, according to bell hooks (2015), is a commitment to reorganizing society toward an equal and inclusive world free of sexism, racism, homophobia, economic inequality, and violence. These qualities make feminist theory increasingly relevant as a critical modality in design research. A recent example is *Feminist Futures of Spatial Practice* by Schalk et al. *(2017)* in which the authors used feminism as a theoretical basis for the construction of more just futures.

There is also an inherent future orientation in feminist social activism, which is concerned with invisible power relations and the politics of temporality. As such, feminists express their desires by representing imagined futures. For example, in *Octavia's Brood: Science Fiction Stories from Social Justice Movements* (brown & Imarisha, 2015), social activists expressed feminist values and desires in an imagined context to explore the possibilities and constraints of alternative futures. In fact, Lauretis (1986) suggested that telling new and retelling well-known stories is a crucial facet of the feminist project, saying "to inscribe into the picture of reality characters and events and resolutions that were previously invisible, untold, unspoken (and so unthinkable, unimaginable, "impossible")" (Lauretis, 1986, p. 11). These alternative stories challenge the dominant narrative, ideologies, and socio-political structures that are forces against the fulfilment of a just society. The 'soft power' of alternative narratives bring into focus certain matters-of-concern from a feminist point of view and destabilize the socio-political orders as an activist practice.

5 Feminist Epistemologies

According to Harding (1993), social dimensions of epistemology were first explored in Hegel's discussion of the master and slave in *The Phenomenology of Spirit* and later evolved in Marxist theories of how class society operates. The Hegelian and Marxist traditions gave rise to the notion of a standpoint of the oppressed as an epistemic position. According to Bowell, "[the] oppressed can eventually reach a state of freedom of consciousness as a result of her/his realization of self-consciousness through struggles against the oppressor" (2011).

Aligned with social epistemologists, feminists explored social dimensions of knowing more broadly. Building on the notion of standpoint, feminist epistemologists started by studying gender as an unprivileged position in knowledge production, that was later expanded to forms of oppression beyond gender. Along these lines Haraway (1985) appropriated the figure of the cyborg as a post-human subjectivity in order to explore different ways of knowing. More specifically, she argues that "one is not born a woman, but becomes one," a statement that post-modern feminists have embraced because it takes seriously the lived experiences of race, class, sexuality, and culture identity. Similarly, 'Situatedness' (Haraway, 1988) is a central concept of feminist epistemology that addresses the belief that what is known reflects the situation or perspective of the knower. Based on this concept, feminists question the unities of their existence, stating:

> *there is nothing about being 'female' that naturally binds women. There is not even such a state as 'being' female, itself a highly complex category constructed in contested sexual scientific discourses and other social practices. Gender, race, or class consciousness is an achievement forced on us by the terrible historical experience of the contradictory social realities of patriarchy, colonialism, and capitalism (Haraway, 1991, p. 155).*

Unlike the atomistic model in epistemology in which knowers have identities, and the social locations of the knower are irrelevant features to include in epistemic assessments (Grasswick, 2016), feminist social epistemologists draw attention to the impact of social location on knowing. One of the best-known areas of theorizing for feminist epistemologists is standpoint theory (Harding 1991), which is positioned against the dominant epistemological tradition. "A standpoint is a project, not an inheritance; it is achieved, not given," (Weeks, 1996). The achievement of an epistemically privileged standpoint stems from an "active political engagement in the feminist cause, and does not

just represent the perspective of women" (Grasswick, 2016). In other words, political participation distinguishes the standpoint from perspective.

6 Feminism and Design

There are three main clusters of literature in the field of design that integrates a feminist perspective: challenging gendered segregation in design research and practice, using feminist theory as a framework for design interventions that impact social orders, and integrating feminist values and qualities to evaluate design research practices and expand the scope of the field.

The first cluster includes the contributions, often scholarly, that reveal the gendered segregation in design practice and research. According to some design historians, women are absent (Bruce, 1985); while others claim that women's contributions to modern design seem to have been ignored (Buckley, 1986; Bruce & Lewis, 1990; Irwin, 2009). Along with the continued imbalance in design practice and academia, there are also reports on gender segregation (Erlhoff & Marshall, 2008). The absence of women in design practice fuels a symbolic, gendered value system in which male attributions in products are valued more highly than female attributions (Ehrnberger et al., 2012). Also, Churchill (2010) reveals the implicit or explicit assumptions in design culture about gendered biases, and how designed artifacts may not serve the needs of women, or in some cases, even be harmful to them.

The second body of literature includes the type of design interventions that embody a political intention and intervene in social orders. According to Ahrentzen (2003), at the conference ANY Event in 1994, the moderator asked a provocative question: "can you have a feminist architecture?" In response, one of the panellists, Elizabeth Grosz, reframed it in perhaps an even more provocative one: "Are there ways of occupying space and producing places that somehow contest, challenge, and problematize the dominant modalities of organization, of space and place?." Similarly, feminist design includes the types of designerly interventions that 'contest,' 'challenge,' and 'problematize' dominant power relations. One example could be 'feminist speculative design' (Prado de O. Martins, 2014), which is proposed as a strategic approach in using artifacts to provoke reflection on privilege and address issues of systemic gender violence and discrimination.

The third cluster includes cases in which feminism is used as a theoretical lens for critique and integrates feminist values in order to generate new design approaches. In human-computer interaction (HCI), Shaowen Bardzell (2010) explores the contribution of feminist theories and methods to HCI in theory, methodology, user research, and evaluation. Also, she proposes a set of feminist values such as pluralism, participation, advocacy, ecology, embodiment, and self-disclosure to support the design and evaluation processes. Similarly, the principles of feminist data visualization are explored by D'Ignazio and Klein (2016). It includes rethinking binaries, embracing pluralism, examining power and aspiring to empowerment as well as considering context, legitimizing embodiment and affect, and, finally, making labor visible (D'Ignazio & Klein, 2016). In a slightly different approach, Bosley (1992), integrates feminist theory with visual design and introduces social constructionism to communication design practitioners.

7 Feminist Futures and Formgiving

"Is knowledge opposed to the future?" writes Grosz (1999, p.21), thereby framing the possibility of an 'open-ended' future, one not determined by the present or the past. She continues, "if dominant modes of knowledge (causal, statistical) are incapable of envisioning the absolutely new, maybe other modes of knowing, other forms of thinking, need to be proposed." As mentioned, dominant modes of design knowledge are based on binary and hierarchical frameworks based on modernist and patriarchal structures and, thereby, excluding and ignoring other modes of thinking. Given the design activism commitment to creating a change, design activists need to expand the scope of their thinking by integrating theories that can bring into the conversation the ignored, the excluded, and the eccentric.

In this paper, we suggest that feminist theory and, in particular, its commitment to social justice as a robust body of theory for the evolution of design activism. Drawing on feminist theory and learning from examples in art and design practice, we suggest three dimensions that characterize a feminist practice of formgiving to futures as a mode of design activism. These dimensions are: temporalities, subjectivities, and hack-abilities.

8 Temporalities of the Futures

According to Inayatullah (2009), there are two ways of conceptually distancing ourselves from the present, 'temporal' distancing (going back and forth in time) and 'epistemological' distancing (seeing the issue from different perspectives). In dominant narratives, the 'future' is positioned as a temporal distance, a singular and universal destination that will arrive through logical and linear pathways. However, rather than understanding time as structured in the three categories of past, present, and future, feminist philosophers take a critical approach, questioning the 'linearity' and 'directionality' of time. Along these lines, there is a growing body of feminist literature arguing for alternative epistemological understandings of time (Grosz, 1999; Grosz, 2005; Barad, 2010; Kafer, 2013; Wajcman, 2015).

Building on epistemological distancing, Elizabeth Grosz defines the future as "other than a performed version of the real" (Smith et al., 2016, p. 38). Forlano and Halpern's Reimagining Work project (2016) is one example of such an interpretation. As part of a research project that explored the relationship between social and economic justice and emerging technologies, the game encourages participants to invent speculative histories. These histories, which stretched from 3000 years in the past to 30 years into the future, revealed invisible power relations and challenge dominant techno-determinist narratives. Redström (2013) complicates our understanding of temporality by framing sustainability as a spatio-temporal phenomenon. He believes that products do not need to exist for a long time to be considered sustainable. Instead, he suggests considering the lifespan of products from 'pre-history' of their production and the 'afterlife.' Alison Kafer (2013) investigates the ways in which temporal logics around disability might be reframed around the notion of crip futures. Drawing on this, Forlano (2017) reflects on the lived experience of Type 1 diabetes to show the friction of normative temporal orders of everyday life for different bodies. She suggests 'slowing down', 'speeding up', 'liminal time', and 'sharing time' as new ways to frame the experience of time around data practices.

Feminist scholars are complicating linear understandings of temporality, revealing the constructed nature of time and its embedded politics. From the perspective of feminist theory, futures are multiple and situated in the social, historical, and ecological context. Informed by the feminist theories around temporality, designers might ask the following questions: How are different bodies experiencing the time differently? What does it mean for generating a positive change through design activism? What other counter-narratives around time have remained invisible?

9 Designers/Users/Participants in Subjectivities

As mentioned earlier, the myth of objectivity has had a widespread impact on design methods and processes, leading to an apolitical design culture. For decades, designers, disengaged with social and political concerns, were designing unique solutions based on their 'expertise'. Based on the core concept of 'situatedness', feminists reject the idea of universalism. For example, in feminist artistic practice, the abstract and universal vision of the artist is replaced with the insistence that all creativity has 'position' (Lauter, 1990). A feminist approach to design activism suggests the importance of subjective and embodied experiences as members of multiple social worlds (Star, 1990) as well as the critical reflection on our own partiality and fallibility in creating universal solutions. For example, Forlano (2016) reflects on her bodily engagement with the socio-technical systems that are used to manage a chronic disease in order to describe new kinds of labor that complicate the common understandings of hacking and technology. Similarly, Chin, in her recent

book *My Life With Things* (2016), explores consumption culture, its complexities, and emotional attachments to it, by reflecting on her bodily experiences with consumer goods and its relationship to her family members.

However, similar to the case for 'activist-oriented STS' (Woodhouse et al, 2002), activist design scholars should recognize that they need to orient their contribution toward a different audience than the two classical audiences of scholars and policymakers. For Suchman, the feminist move "reframes the locus of objectivity from an established body of knowledge not produced or owned by anyone, to knowledges in dynamic production, reproduction and transformation, for which we are all responsible" (Suchman, 2002). In other words, making oppressed groups more visible is insufficient, and, rather what is called for is a strategy that positions them as agents. This suggests that activist designers need to co-create the process of formgiving to possible futures. This brings up the dimensions of accessibility and inclusiveness in design interventions. For example, the artist Robert Karimi uses public spaces for his interactive art installations, which are entitled *The Peoples Cook*. The platform provides a space for a collaborative meal preparation, in which both the artist and participants share stories. Filled with humor and engagement, it encourages participants to take an active role in an exchange their viewpoints in addressing community issues.

10 Hack-abilities and Futures

Feminist theorists argue that the boundaries between binary categories are blurring. For example, the concept of 'cyborg' (Haraway, 1985) is introduced as an alternative identity in a world where the borders of human and machine, male and female are increasingly intertwined. Based on the concept of 'situatedness' (Haraway, 1988), feminists questioned the unities in their existence, stating that "Gender, race, or class consciousness is an achievement forced on us by the terrible historical experience of the contradictory social realities of patriarchy, colonialism, and capitalism" (Haraway, 1985). Rather than a singular, linear pathway towards a utopian/dystopian future, feminist theory advocates for pluralistic thinking Suchman (2011), which supports a multiplicity of the ideas of the future, indicated by the 's' in future(s).

We expand on this concept arguing that hack-ability, appropriation and modification are key qualities of multiple futures. Hack-ability supports the collective work of formgiving to futures through the continued participation of diverse people who are empowered to have a say in their own futures. *Radical Childcare* is an example of hack-ability for design services and interventions. In a speech given by Camille Barbagallo (2017) at The World Transformed Festival, she addressed the need to develop progressive solutions to the current crises faced by caregivers. Barbagallo stressed that, in the face of today's for-profit childcare providers, another vision for care is not only possible, but is also necessary. She proposed the establishment of Community Care Centres that are accessible, affordable, and inclusive. These centers that can be hacked by both their workers and care receivers to better meet their needs. Aside from the hack-ability of the concept, the proposal itself is hackable. There are no citations or affiliations that validate the concept. Also, suggesting the establishment of centers seem unfinished compared to service design blueprints and visual storyboards. The constellation of these gestures, suggests a hackable image of the future and encourages non-experts to contribute and alter it according to their unique needs. A similar example is the series of *Speculative Civics* design workshops (DiSalvo et al., 2016) in which the medium of design is used to facilitate conversation. The goal is to help the community participants to reveal their concerns about adaptation of technology and propose possible strategies to gain control over it. Rather than new technology solutions, the workshops led to hackable proposals for interested parties to implement.

As the call for reimagining passive users into more active participants requires a deeper and more reflective approach in design methods and processes (Forlano, 2017b), incorporating hack-ability requires new considerations as well. Design activists should re-evaluate their perception of design as a 'problem-solving' strategy. Instead of adopting the skills that further isolate designers as the sole

‘experts’ in the game, design activists should develop new methods and resources to gain deeper solidarity in relation to the context and participants. Authors suggest critically mapping stakeholders who should have a say in the conversation, adopting multiple strategies for capturing participants’ viewpoints (interviewing, making, reflecting), and including the co-creation of project values and criteria for success in the design process, as the starting point to move beyond existing forms of inequality embedded in design practice.

11 Conclusion

In this paper, drawing on feminist theory, we conceptualize formgiving to alternative futures as a mode of design activism that can promote social and economic justice. We argue that the designerly approach to externalizing ideas about possible futures is a mode of speaking to power. As designerly representations of possible futures enter into the public realm, they have the potential to shift the narratives about the present by spreading provocative alternatives, thereby, promoting social and political change. We outlined three core dimensions for feminist formgiving to alternative futures as a mode of design activism: temporalities, subjectivities, and hack-abilities. By highlighting these dimensions, we aim to engage design scholars and practitioners in alternative future-making.

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Design Justice: towards an intersectional feminist framework for design theory and practice

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Design is key to our collective liberation, but most design processes today reproduce inequalities structured by what Black feminist scholars call the *matrix of domination*. Intersecting inequalities are manifest at all levels of the design process. This paper builds upon the Design Justice Principles, developed by an emerging network of designers and community organizers, to propose a working definition of design justice: Design justice is a field of theory and practice that is concerned with how the design of objects and systems influences the distribution of risks, harms, and benefits among various groups of people. Design justice focuses on the ways that design reproduces, is reproduced by, and/or challenges the matrix of domination (white supremacy, heteropatriarchy, capitalism, and settler colonialism). Design justice is also a growing social movement that aims to ensure a more equitable distribution of design's benefits and burdens; fair and meaningful participation in design decisions; and recognition of community-based design traditions, knowledge, and practices.

design justice, intersectional feminism, matrix of domination

1 Introduction

In June of 2015, at the Allied Media Conference in Detroit, a group of 30 designers, artists, technologists, and community organizers took part in the workshop "Generating Shared Principles for Design Justice." The goal of the workshop was to move beyond the frames of 'social impact design' or 'design for good,' to challenge designers to think about how good intentions are not necessarily enough to ensure that design processes and practices become tools of liberation, and to develop principles that might help practitioners avoid the (often unwitting) reproduction of existing inequalities. The draft principles developed at that workshop would come to be refined over the next few years, and were most recently (in 2018) released in the following form:

> ***Design Justice Network Principles***
>
> *This is a living document.*
>
> Design mediates so much of our realities and has tremendous impact on our lives, yet very few of us participate in design processes. In particular, the people who are most

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adversely affected by design decisions — about visual culture, new technologies, the planning of our communities, or the structure of our political and economic systems — tend to have the least influence on those decisions and how they are made.

Design justice rethinks design processes, centers people who are normally marginalized by design, and uses collaborative, creative practices to address the deepest challenges our communities face.

- We use design to **sustain, heal, and empower** our communities, as well as to seek liberation from exploitative and oppressive systems.
- We **center the voices of those who are directly impacted** by the outcomes of the design process.
- We **prioritize design's impact on the community** over the intentions of the designer.
- We view **change as emergent from an accountable, accessible, and collaborative process**, rather than as a point at the end of a process.
- We see the role of the **designer as a facilitator rather than an expert.**
- We believe that **everyone is an expert based on their own lived experience**, and that we all have unique and brilliant contributions to bring to a design process.
- We **share design knowledge and tools** with our communities.
- We work towards **sustainable, community-led and -controlled** outcomes.
- We work towards **non-exploitative solutions** that reconnect us to the earth and to each other.
- Before seeking new design solutions, **we look for what is already working** at the community level. We honor and uplift traditional, indigenous, and local knowledge and practices."

(Design Justice Network, 2016: http://designjusticenetwork.org/network-principles).

In this paper, I will attempt to further develop the approach articulated in the Design Justice Principles, and to explore design justice as a broader framework that might guide design theory and practice across a wide range of fields.

2 Naming oppressive systems: On intersectionality and the matrix of domination

Design is key to our collective liberation, but most design processes today reproduce inequalities that are structured by what Black feminist scholar Patricia Hill Collins calls the matrix of domination: white supremacy, heteropatriarchy, capitalism, and settler colonialism (Collins, 2000). These and additional intersecting inequalities are manifest at all levels of the design process, including (but not limited to): designers, intended users, values, affordances and disaffordances, scoping and framing, privileged design sites, governance, ownership, and control of designed objects, platforms, and systems, and narratives about how design processes work.

The Design Justice Principles (above) were proposed in part as a response to this situation. These principles are an important starting point for growing a network of practitioners who care about articulating and more intentionally practising design that, as much as possible, avoids reproducing structural inequality and oppression. The first principle states that design justice practitioners "seek liberation from exploitative and oppressive systems." More explicitly naming the oppressive systems that design justice seeks to counter can strengthen the approach. To do this work, we can draw upon the tradition of Black feminist thought.

3 Intersectionality

First, we need to briefly clarify the concepts of intersectionality and the matrix of domination. Black feminist thought fundamentally reconceptualizes race, class, and gender as interlocking systems: they do not only operate 'on their own,' but are often experienced together, by individuals who exist at their intersections. The analytical framework built on this fundamental insight from Black feminist thought and experience is called intersectionality. The term was first proposed by Black feminist legal scholar Kimberlé Crenshaw in her 1989 article "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics." In the article, Crenshaw describes how existing antidiscrimination law (Title VII of the Civil Rights Act) repeatedly failed to protect Black women workers. First, she discusses an instance where Black women workers at General Motors (GM) were told they had no legal grounds for a discrimination case against their employer, because antidiscrimination law only protected single-identity categories. The Court found that GM did not systematically discriminate against all women, because the company hired white women, and that there was insufficient evidence of discrimination against Black people in general. Thus, Black women, who did in reality experience systematic employment discrimination as Black women, were not protected by existing law, and had no actionable legal claim. In a second case described by Crenshaw, the court rejected the claims of a Black woman who claimed discrimination by Hugh Helicopters, Inc., because "her attempt to specify her race was seen as being at odds with the standard allegation that the employer simply discriminated 'against females'" (Crenshaw, 1989). In other words, the court could not accept that Black women might be able to represent all women, including white women, as a class. In a third case, the court *did* award discrimination damages to Black women workers at a pharmaceutical company, but refused to award the damages to all Black workers, under the rationale that Black women could not adequately represent the claims of Black people as a category. Crenshaw notes the role of statistical analysis in each of these cases: sometimes, the courts required Black women to include broader statistics for all women that countered their claims of discrimination; in other cases, the courts limited the admissible data to that dealing with Black women only. In those cases, the low total number of Black women employees typically made statistically valid claims impossible, whereas strong claims could have been made if the plaintiffs were allowed to include data for all women, for all Black people, or both. Later, in her 1991 Stanford Law Review article "Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color," Crenshaw (1991) powerfully articulates the ways that women of colour often experience male violence as a product of intersecting racism and sexism, but are then marginalized from both feminist and antiracist discourse and practice, and denied access to specific legal remedies.

The concept of intersectionality provided the grounds for a long, slow paradigm shift that is still unfolding in the social sciences, legal scholarship, and in other domains of research and practice. This paradigm shift is also beginning to transform the domain of design. What Crenshaw calls 'single-axis analysis,' where race or gender are considered as independent constructs, has wide reaching consequences for design theory and practice.

Universalist design principles and practices, and even evaluations of fairness or equity in design that are single-axis, erase certain groups of people, specifically those who are intersectionally disadvantaged or multiply-burdened under white supremacist heteropatriarchy, capitalism, and settler colonialism, in the design of objects and systems. When designers do consider inequality in technology design (and most professional design processes do not consider inequality at all), they nearly always employ a single-axis framework. Most design processes today are therefore structured in ways that make it impossible to see, engage with, account for, or attempt to remedy the unequal distribution of benefits and burdens that they reproduce. As Crenshaw noted, feminist theory and antiracist policy that is not grounded in intersectional understanding of gender and race cannot adequately address the experiences of Black women when it comes to the formulation of policy demands. Design justice holds that the same is true when it comes to 'design demands.'

4 The matrix of domination

Closely linked to intersectionality, but less widely used today, the *matrix of domination* is a term developed by Black feminist scholar Patricia Hill Collins to refer to race, class, and gender as interlocking systems of oppression, rather than each operating 'on its own.' It is a conceptual model that helps us think about how power, oppression, resistance, privilege, penalties, benefits, and harms are systematically distributed. When she introduces the term, in her book *Black Feminist Thought* (2002), Collins emphasizes race, class, and gender as the three systems that historically have been most important in structuring most Black women's lives. She notes that additional systems of oppression structure the matrix of domination for other kinds of people. The term, for her, describes a mode of analysis that includes any and all systems of oppression that mutually constitute each other and shape people's lives.

This framework also emphasizes that every individual simultaneously receives both benefits and harms, or 'penalty and privilege,' based on their location within the interlocking systems of oppression that structure our experience. As Collins notes, "Each individual derives varying amounts of penalty and privilege" within the matrix of domination (Collins, 2002). An intersectional Black feminist analysis thus helps us each see that we are simultaneously members of multiple groups, both dominant and subordinate. Design justice urges us to consider how design (affordances, objects, systems, processes) simultaneously distributes both penalty and privileges to individuals based on their location within the matrix of domination, and to attend to the ways that this operates at various scales.

In Black Feminist Thought, Collins notes that "People experience and resist oppression on three levels: the level of personal biography; the group or community level of the cultural context created by race, class, and gender; and the systemic level of social institutions. Black feminist thought emphasizes all three levels as sites of domination and as potential sites of resistance" (Ibid.). Design justice as a framework urges us to explore the ways that design relates to domination and resistance at each of these three levels (personal, community, and institutional). For example, at the personal level, we might explore how interface design affirms or denies a person's identity through features such as, say, a binary gender drop-down during account profile creation. More broadly, we might consider how design decisions play out in the impacts they have on different individual's biographies or life-chances. At the community level, we might explore how platform design fosters certain kinds of communities while suppressing others, through setting and implementing community guidelines, rules, and speech norms, instantiated through different kinds of content moderation systems. At the institutional level, design justice asks us to consider the ways that various design institutions reproduce and/or challenge the matrix of domination in their practices. This might include large companies (Google, Apple, IDEO), venture capitalists, standards-setting bodies (ISO, W3C, NIST), laws (such as the Americans with Disabilities Act), and universities and educational institutions that train designers.

Additionally, institutions design objects, systems, and processes that they then use to distribute benefits and harms across society. For example, the ability to immigrate to the United States is unequally distributed among different groups of people through a combination of laws passed by the U.S. Congress, software decision systems, executive orders that influence enforcement priorities, and so on. Within the broader immigration system, visa allocation is an algorithm that has been designed according to the ideology and political priorities of those who hold political power.

Finally, Black feminist thought also emphasizes the value of situated knowledge over universalist knowledge. In other words, particular insights about the nature of power, oppression, and resistance come from those who occupy a subjugated standpoint, and knowledge developed from any particular standpoint is always partial knowledge.

5 A tentative definition of design justice

Having briefly explored the ideas of intersectionality and the matrix of domination, I offer the following tentative definition of design justice:

> *Design justice is a field of theory and practice that is concerned with how the design of objects and systems influences the distribution of risks, harms, and benefits among various groups of people. Design justice focuses on the ways that design reproduces, is reproduced by, and/or challenges the matrix of domination (white supremacy, heteropatriarchy, capitalism, and settler colonialism). Design justice is also a growing social movement that aims to ensure a more equitable distribution of design's benefits and burdens; fair and meaningful participation in design decisions; and recognition of community-based design traditions, knowledge, and practices.*

This definition emphasizes that design justice is both procedural and distributive: we have an ethical imperative to systematically advance the participation of marginalized communities in all stages of the technology design process; through this process, resources and power can be more equitably distributed. Procedural goals are reflected in the second Design Justice Principle ("we center the voices of those who are directly impacted by the outcomes of the design process"), while distributive goals are emphasized in the third ("we prioritize design's impact on the community over the intentions of the designer").

In this definition, design justice also has both normative and pragmatic justifications: it is based on broader ideals of democratic inclusion and social justice in all spheres of life; at the same time, design processes that operate according to these ideals can produce products, processes, and systems that work better for all of us, in the long run.

This is not meant to be the only definition of design justice, but rather a provisional proposal that we can use to build a conversation. There is already a growing community of people who identify with the term design justice, and many have worked to explore the idea and clarify what it might mean.

Design justice as a framework asks us to engage with a series of questions about how design processes currently work, and about how we want them to work. These include questions of equity (who gets to do design?), beneficiaries (who do we design for, or with?), values (what values do we encode and reproduce in the objects and systems that we design?), scope (how do we scope and frame design problems?), sites (where do we do design, what design sites are privileged and what sites are ignored or marginalized, and how do we make design sites accessible to those who will be most impacted?), ownership, accountability, and political economy (who owns and profits from design outcomes, what social relationships are reproduced by design, and how do we move towards community control of design processes?), and discourse (what stories do we tell about how things are designed?) In the next section of this paper, I will briefly engage with several of these questions, in an attempt to illustrate the generative power of the proposed definition of design justice.

6 Designers: Who gets (paid) to do design?

Design justice as a theoretical framework recognizes the universality of design as a human activity. "Design," in a general sense, means problem-solving; all human beings participate in design (Papanek & Fuller, 1972). Design theorist Anne-Marie Willis (2006) put it this way: "Design is something far more pervasive and profound than is generally recognised by designers, cultural theorists, philosophers or lay persons; designing is fundamental to being human — we design, that is to say, we deliberate, plan and scheme in ways which prefigure our actions and makings […] we design our world, while our world acts back on us and designs us." Through this lens, and inspired by feminist critiques of the invisibilized, unpaid labour of reproduction (for example, see Dalla Costa, 1999), design justice includes a call for broader recognition of everyday design practices.

At the same time, as Willis notes, 'design' is also often used to refer to expert knowledge and practices contained within a particular set of professionalized fields, including software development, architecture, planning, and industrial design, as well as in various media and audiovisual industries, such as graphic design. Within a discussion of 'design' as a specialist activity, or as a certain type of work accomplished by experts, there is also a significant and steadily growing literature on design practices by marginalized people. Alternative histories of technology and design help to recuperate and center people, practices, and forms of expertise that have long been erased by mainstream theory and history, both in scholarly and popular writing. Some histories of invisibilized technology design work have been widely popularized; for example, the 2016 film Hidden Figures chronicles the work of Katherine Johnson and other Black women who worked for NASA as "human computers," coding space flight trajectories (Shetterly, 2016). Additionally, recent literature on innovation decenters the myth of the individual designer and emphasizes the key roles played by 'lead users' who constantly modify, hack, repurpose, and reuse technologies in order to better fit their needs (Von Hippel, 2005).

With these caveats — all humans design, design is not only the domain of paid experts, the contributions of expert designers and technologists who are not wealthy and/or educationally privileged white cisgender men have been erased from history, and professional designers constantly draw both from one another and from the unsung design work of everyday people — it is still possible and valuable to consider the ways that the matrix of domination systematically structures paid professional design work.

Although the discussion that follows could easily apply to any of the professionalized design fields, we will focus on the U.S. software industry. Designers in this sector are highly rewarded, both economically and culturally, and have achieved status as iconic figures who stand in for the promise of innovation and entrepreneurialism under informational capitalism.

There has been a growing public conversation about the fact that the most advanced sector of the economy might well be the most unequal. In 2016, many Silicon Valley firms, under pressure from mobilized publics, released diversity data about their employment practices. Unsurprisingly, this data did not paint a flattering picture of progress towards gender and racial equity. Overall, white and Asian cisgender men dominate software industry jobs. For example, in the United States, women overall hold 25% of these jobs; Black women hold just 3% of computer programming jobs, and Latinas, 1% (Ashcraft, Eger & Friend, 2012). Even when women and People of Colour (POC) are employed in technology design, development, and product management, in a context of extremely hierarchical organizations, only a handful of women have positions at the top. Gender diversity on the boards of top software and technology companies tends to range between just 10% to 25% (almost exclusively white) cisgender women. For example, Apple's board has six men and two women, Google, eight and three; Microsoft, eight and two; Twitter, seven and one; eBay, eleven and one, and so on. Yahoo, with a board composed of six men and three women, is the top-tier software firm that comes closest to gender parity at the highest decision-making level (Evans & Rangarajan, 2017).

These dismal employment equity statistics reflect broader raced and gendered patterns that persist across nearly all sectors of the U.S. economy (Weeden, Cha & Bucca, 2016; Wilson, 2016; Arce & Seguar, 2016). Racial and gender inequality in who gets paid to do design is consistent with persistent structural inequality across a stratified labour market; it is also shaped by inequalities in access to education. In a broader context of rising wealth inequality, a winner-take-all dynamic is at play, with wealthy whites withdrawing children and tax dollars from schools that used to serve mixed income and multiracial populations. White flight, and later, gentrification and the recolonization of urban cores, have produced a school system where nearly half of Black & Latino students attend schools with poverty rates higher than 75%, vs. less than 5% of Whites (Orfield, Ee, Frankenberg & Siegel-Hawley, 2016). Schools in low-income communities of colour are rarely allocated the resources they need to provide high quality STEM education. As a result, Black, Latinx,

and low-income students are statistically more likely to be taught by less experienced teachers, receive less funding per student, face lower expectations, score lower on standardized STEM tests, and are less likely to enter higher education in STEM fields (Flores, 2007). Other factors that militate against more women, POC, and LGBTQI people gaining STEM education, and thereby moving into lucrative design positions in the software and technology professions, include the de-funding of public education, the rise of mass incarceration and the school to prison pipeline, school push-out, and in-school abuses faced by LGBTQ and GNC youth, especially LGBTQ youth of colour (Costanza-Chock, Schweidler & Transformative Media Organizing Project, 2017).

7 Towards equity in the tech workforce: organizations that build the design skills of more women, POC, and LGBTQ folks

Despite recent attention to the lack of diversity in the tech sector, the debate about gender and racial equity in science and technology is not at all new. Many organizations have long worked towards gender parity in STEM fields. For example, the National Center for Women & Information Technology (NCWIT), a community of several hundred companies, universities, government agencies, and non-profit organizations, was founded in 2004 by the National Science Foundation to advance women and girls' participation in ICTs. For a recent review of best practices towards gender equity in computer science education, see Hamilton, et. al. (2016). In addition to long-standing organizations and initiatives, a number of groups have recently emerged that focus on building the design, tech, and media skills of girls and women, POC, and LGBTQ folks. For example, Black Girls Code, started in 2011, teaches young African American women the basics of computer science and software development. Girls Who Code (http://girlswhocode.com), launched in 2012, focuses on eliminating the gender gap in the technology and engineering sectors. Code2040, based in San Francisco, works "to ensure that by the year 2040 - when the US will be majority Black and Latinx - we are proportionally represented in America's innovation economy as technologists, investors, thought leaders, and entrepreneurs." (Code2040.org, 2017). The Lesbians Who Tech Summit provides a physical meetup and networking space for lesbians working at all levels of technology industries. Trans Tech Social Enterprises aims to provide jobs and job training in web design to trans* folks in the Chicago area, and Trans*H4CK is a series of hackathons by and for trans* and gender non-conforming people. Trans*H4ACK has grown rapidly, and has organized local events in San Francisco, Boston, and many other cities (See http://www.transhack.org).

These and similar initiatives are important developments. However, design justice impels recognition that employment in paid design fields is important, but is not the whole picture. We also need to rethink a number of other aspects of current design practice, including the intended beneficiaries of design.

8 'Users:' Who do we design for/with?

We must also examine design beneficiaries. In other words, who are we designing for? Journalist and feminist activist Laurie Penny puts it this way:

> *"There is nothing wrong with making things that people want. The problem is that personhood and desire are constrained by capital; money affects whose wants appear to matter. The kids in Startup House may want a pizza delivery drone, but not in the same way low-income families want health care, or the elderly men lying in their own faeces on Howard Street want a safe place to sleep. There is nothing wrong with making things people want. It's just that too little attention is being paid to the things people need. The wants and needs of young, healthy, middle-class people with connections and a reasonable amount of spare cash are over-represented among Start-up City's priorities. For one thing, those are the problems with solutions that sell. For another, given a few million dollars and a team of semi-geniuses, those problems are easy to solve. Structural*

social injustice and systemic racism are harder to tackle – and that's where the tech sector has, until recently, thrown up its hands." (Penny, 2014).

To Penny's critique of the classed prioritization of users within capitalist start-up scenes, we can add that the 'default' imagined users are often raced, classed, and gendered within a worldview produced by the matrix of domination and internalized, then reproduced, by design teams. Designers most frequently assume that the unmarked user has access to a number of very powerful privileges, such as U.S. citizenship, English language proficiency, access to broadband internet, a smartphone, no disabilities, and so on. Diversifying the software workforce, unfortunately, will not automatically produce a more diverse default imagined user. Unless the gender identity, sexual orientation, race/ethnicity, age, nationality, language, immigration status, and other aspects of end user identity are specified in advance, the imagined user for whom technology design teams develop products tends to default to the dominant social group. In the U.S., this means straight white middle class cisgender men, with educational privilege and high technological literacy, citizenship, native English speakers, and so on. Even with diverse design teams, the types and scope of 'problems' addressed by most product design ends up limited to this tiny, but potentially highly profitable, subset of humanity.

There is growing awareness of this problem, and a number of designers, projects, events, and communities of practice who are attempting to address it through intentional focus on designing for, or with, communities who are usually invisibilized in the world of technology. For example, the Trans*Hack series of hackathons focus on trans* and gender nonconforming communities; the Make the Breast Pump Not Suck! Hackathon focuses on breastfeeding parents; and Contratados.org, operates like a "Yelp, for migrant workers" to review potential employers and recruitment agents, educate migrant workers about their rights, and protect them from transnational recruitment scams.

9 Accountability: "Nothing About Us, Without Us"

We began this section by considering the ways that race and gender structure employment in the software and technology design industries; we then introduced a discussion of the ways the matrix of domination structures our ideas about who to design for. Ultimately, we have moved from an argument for equity (we need diverse designers, and diverse users) to an argument for accountability (those most affected by the outcomes should lead and own digital design processes and products). In a nutshell: according to both the Design Justice Principles and our tentative definition of design justice, the most valuable 'ingredient' in design justice is the full inclusion of people with direct lived experience of the conditions the design team is trying to change.

This reflects the 'participatory turn' in technology design; for example, see intersecting histories of User-Led Innovation, Participatory Design (Schuler & Namioka, 1993; Muller & Kuhn, 1993), and Feminist HCI (Bardzell, 2010, and see recent work by the organizers of the Design, Research, and Feminism(s) Track at DRC2018: Ramia Mazé, Laura Forlano, Li Jonsson, Kristina Lindström, and Åsa Ståhl). Additionally, design justice draws from the disability justice movement, whose activists popularized the phrase "Nothing About Us, Without Us" (Charlton, 1998). The key lessons include: involving members of the community that is most directly affected by the issue that you are focusing on is crucial, both because it's ethical, and also because the tacit and experiential knowledge of community members is sure to produce ideas, approaches and innovations that a non-member of the community would be very unlikely to come up with. It is also possible to create formal community accountability mechanisms in design processes.

10 Values: What values and assumptions do we encode in designed objects and processes?

Scholars of science and technology have long noted that values are encoded in, and reproduced through, the affordances of the objects, processes, and systems that we design (Friedman, 1997; Flanagan, Howe, & Nissenbaum, 2008). In addition to shifting designers and users, design justice proposes systematic evaluation of the values that we choose to encode in designed objects and systems. Intersecting forms of oppression, including white supremacy, cisnormativity, heteropatriarchy, capitalism, and settler colonialism, are hard-coded into designed objects and systems. This typically takes place not because designers are intentionally 'evil,' but largely through structural forces: resources for design are typically allocated based on potential profitability, and that means most resources are dedicated to design problems that affect the wealthiest groups of people. In addition, at the level of the individual designer or design team, several mechanisms that introduce unintentional bias are at play. These include assumptions about the 'unmarked' end-user, limited feedback loops, and (most recently), the use of systematically biased datasets to train algorithms using machine learning techniques (Munoz, Smith, & Patil, 2016).

The emergence of 'values in design' is an important shift in design thinking and practice, but design justice goes further, to consider not only the ways that we hard-code oppressive values and norms into affordances, but also the transformative potential of broader participation in the design process, as well as ownership and stewardship of the results. We might consider case studies in areas as diverse as consumer electronics (cameras), algorithm design in sectors such as banking, housing, and policing, and on the other end of the spectrum, intentional values based design in projects like Contratados, and so on. For example, "Native Americans, African Americans, and other people of colour are banned disproportionately because, to Facebook, a "real" name sometimes means "traditionally European" (Kirkham, 2015). This happens, in part, because the algorithms used to flag 'real' vs. 'fake' names were trained on real name datasets that over-represent European names, using machine learning and natural language processing techniques.

The LGBTQ community, and in particular, drag queens, did successfully organize to force Facebook to modify its 'real name' policy. Many LGBTQ folks choose to use names that are not their given name on social media platforms, for various reasons, including a desire to control who has access to their self-presentation of sexual orientation and/or gender identity (SOGI). For many, undesired 'outing' of a non hetero- and/or cis- normative SOGI may have disastrous real-world consequences, from teasing, bullying, and emotional and physical violence from peers, to loss of family, a stable housing situation, access to resources for education, and so on. Facebook systematically flagged and suspended accounts of LGBTQ people who it suspected of not using 'real names,' especially drag queens; drag queens fought back. After several prominent drag queens began to leave the hegemonic social network for start-up competitor Ello, Facebook ultimately implemented both modifications to its real-name flagging and dispute process and instituted a new set of options for users to display gender pronouns and gender identity, as well as more fine-grained control over who is able to see these changes. These examples demonstrate the ways that dominant values are typically encoded in the affordances of systems that we design and build - in this case, assumptions about names, pronouns, and gender that were built into various aspects of Facebook interface design. They also demonstrate how, typically through user mobilization, platforms and systems can be redesigned to encode alternative value systems.

Overall, design justice builds on the foundational work in values in design (VID). VID emphasizes that designers make intentional choices about the affordances and aesthetics of objects and systems that they create. The approach proposes rubrics for analysis of how designed affordances encode particular value sets, as well as evaluation of design projects according to their values. However, design justice as an approach goes several steps further. First, VID is 'apolitical,' in the sense that the approach suggests that designers should make conscious choices about the values they wish to encode, but avoids a normative stance as to what such values should be. Design justice, as we have

seen, begins instead with an intersectional analysis of the matrix of domination, and proposes a systematic effort to encode liberatory values that counter white supremacist capitalist heteropatriarchy, ableism, and settler colonialism. Design justice centers the perspectives and values of Queer, trans*, Black and POC, indigenous, migrant, decolonial, anti-authoritarian, and commons-based communities, among others, while recognizing that there is always conflict both within and between marginalized groups. Additionally, where values in design tends to focus on the affordances and aesthetics of designed objects or systems, design justice is concerned with all aspects of design, including the values that are reproduced in the social relations of power of the design process itself, as well as what happens to the profits, attribution, and governance of the designed object or system.

11 Conclusions: Towards Design Justice

We began with the Design Justice Principles, then moved to a brief discussion of intersectionality and the matrix of domination. We then posited a tentative definition of design justice as a framework. We explored the implications of design justice for questions about who gets to do design, who we design for (or with), and the values we encode in designed objects and systems.

The design justice framework raises many other questions that we will not be able to explore here in depth, such as design scoping, sites, platforms, and pedagogy. Design justice encourages a shift from deficit to asset-based approaches to design scoping, the formal inclusion of community members in design processes during scoping; and the valorization of intentionally inclusive hacker and makerspaces (such as Liberating Ourselves Locally, a QTPOC led hackerspace in Oakland, but see Irani, 2015 re: Hackathons and entrepreneurial citizenship). Design justice also has implications for the current discussion of platform cooperativism (Scholz & Schneider, 2016); projects that challenge the matrix of domination at the level of the platform include worker-centered projects like Turkopticon, SherpaShare, Stocksy, Union Taxi, and more. Applied to labour markets, design justice requires that designers and developers involve workers, worker advocacy organizations, and cooperatives from the beginning in the design of (cooperative, worker owned) platforms in various sectors. Additionally, a design justice framework requires that we consistently attend to the question of who receives credit for innovative design work. For example, social movement media innovations are often adopted by the journalism profession and by the broader cultural industries, although stripped of their original counter-hegemonic intent. Examples might include Indymedia and CNN iReports, TxtMob and Twitter, and DIY livestreams from DeepDish TV to Occupy (GlobalRevolution, Timcast) to Facebook Live (Costanza-Chock, 2012).

These and other questions about design practices will have to wait for future explication. It will also be useful to develop rubrics for evaluation rooted in design justice: how do we determine the degree to which a given design project, process, product, or object follows the design justice principles? We might develop and share design justice tools and toolkits, guides, checklists, and case studies, along with best practices and awards.

Indeed, the Design Justice Network is already engaging in some of these activities. There are a growing number of organizations, spaces, networks, and events that share a vision of design justice. Design organizations like And Also Too, in Toronto, Intelligent Mischief, in Boston, and the worker-owned cooperative Research Action Design (RAD.cat), are putting design justice principles into practice in their daily work.

There is also a growing community that is focused on challenging the design of algorithmic bias, with a wave of recent feminist publications such as Virgina Eubanks' *Automating Inequality* and Safiyah Noble's *Algorithms of Oppression*. There are new organizations such as Data4BlackLives, the AI Now Institute, Data and Society, the Data Justice Lab, and the Algorithmic Justice League, and conferences such as Fairness, Accountability, and Transparency in Machine Learning.

Finally, the Design Justice Network is growing rapidly. This network, composed of designers who work with social movements and community-based organizations, as well as community organizers

who use design as a tool to build power in their neighbourhoods, authored the Design Justice Principles that opened this paper. The network has produced a series of 'zines, and coordinated a Design Justice Track at the Allied Media Conference in 2017 and again in 2018. I urge readers to explore the work of the Design Justice Network, to sign on to the Design Justice Principles, and to develop additional work through the design justice lens.

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"*All about Love*": How would bell hooks teach fashion design?

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This paper introduces a PhD project which draws on theories from Black and Women of Colour feminists to develop anti-racist fashion design pedagogies. These pedagogical experiments demonstrate the value of Black and Women of Colour feminist scholarship for fashion design education through its call for the decolonization of pedagogy. Feminist scholarship emphasises the role of everyday life and ordinary experiences which can have the potential to disrupt hegemonic thinking. Such experiences could help shape new fashion design pedagogies and culture. I will suggest how using bell hook's conception of "love" could also be taken up by fashion design educators to encourage students to explore points of connection and disconnection between different cultures, histories and experiences. hook's notion could, I will also suggest, foster students' active awareness of how local and global cultures and histories might be more creatively interwoven to create a design process that resists stereotyping, appropriation and racist forms of representation.

feminism; fashion design; design pedagogy, decolonization

1 Introduction

Over the many hours I have poured over the writings of my favourite Black and Women of Colour feminist authors, I have often wondered how they would teach fashion design, a subject that I have taught for over fifteen years in the U.K. What do these authors even think of fashion design and its relationship to a fashion industry which today stands accused of reinforcing "racism, sexism, gender stereotypes, class and unequal power relations" (Hoskins, 2014, p.149)? Given the opportunity, I would ask bell hooks, "how would *you* teach fashion design"? Using this question as a starting point, this paper will look at how fashion design in the global North needs be decolonized in order to engage with wider global fashion narratives in a more culturally diverse way. This drive for more plural narratives that engage with the dynamics of different forms of fashion design responds to academic studies that highlight the need to address the perception that fashion is primarily a Western phenomenon; and that, more precisely, the West has fashion, modernity and progress and the non-West does not (or at least, where it does, that it originates elsewhere) (Niessen, 2003).

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This paper will do two things. First, it will discuss the ways in which racial hierarchies are constructed in fashion design; and, second, it aims to test how to re-think undergraduate fashion design pedagogies in the UK in order to de-centre the dominance of Eurocentric approaches. This paper draws on literature written by Black and Women of Colour feminists that debate how the education system plays a role in maintaining racial and gender inequalities (Mirza, 1997; hooks, 2000; Mohanty, 2003; Theuri, 2014). These contributions discuss the role of racism in pedagogical processes in art and design higher education.

To date, the small, but growing body of academic work undertaken on fashion design pedagogies focuses on creative strategies such as mood boards and drawings in fashion design processes (Gillham & McGilp, 2002; Dirix, 2013). However, research undertaken on socio-cultural contexts of fashion design are less developed (McRobbie, 1998). Instead, the majority of academic research that investigates the role that racial and cultural bias plays in art and design remains focused on art pedagogies (Hatton, 2015). This paper will demonstrate how the gaps in existing academic research on fashion design education and racial hierarchies need to be addressed for at least two reasons. Firstly, education systems continue to play an important role in reproducing racial inequalities from their selection processes to curricula, teaching and assessment methods (Gillborn, 2008; Gabriel, 2013). So, there is a challenge to better understand how design activities in fashion design education (student's work and curricula) encourage practices that marginalize and 'Other' different racial groups (Puwar & Bhatia, 2003; Kondo 1997; Geczy, 2013). Secondly, pedagogical interventions have been encouraged as a powerful way to disrupt hegemonic thinking and to achieve the aims of social justice and equality (hooks, 1994; hooks, 2000; Giroux 2005).

To critically engage with these topics, this paper is divided in three parts. Firstly, it will reflect on fashion design education today to identify how racial bias is constructed in the fashion design process. This section will also present a discussion about what these practices reveal about fashion design pedagogies in the U.K. Secondly, the paper will discuss the Eurocentric bias in undergraduate fashion design pedagogies in the U.K by examining resources that are used to teach fashion design. The third and final part of this paper explores how the concept of decolonial fashion could help introduce a workshop based on bell hooks concept of 'love' to offer an alternative to dominant Eurocentric thinking in fashion design education. Theories of decolonization problematize and interrogate the different ways in which Western colonialism exerts its global power (Mignolo, 2012 [2000]).

The aim of this practice-based PhD project is to develop new strategies and resources to support fashion design educators who are looking to challenge racial inequalities. The project aims to intervene into and disrupt hegemonic thinking in fashion design education through the development of social justice-oriented forms of fashion design pedagogy which could contribute to greater societal equality, with a particular focus on race (hooks, 1994; Giroux 2005).

2 Fashion Design Education Today

Since I began to teach fashion design in the year 2000, in further and higher education in London, there has been an exponential growth in fashion design education, both in the UK and globally. In the UK an estimated 16, 300 fashion design students graduate annually from over 326 fashion degree programmes (Eagle, 2013). An increasing number of these students are international and BAME (Black and Minority Ethnic) home students, particularly in London. Therefore, in this context there is a need to create more opportunities to integrate diverse perspectives and knowledge into fashion design pedagogies. However, current provision of undergraduate fashion design in the U.K tends to underplay issues related to cultural diversity (www.allwalks.org). The question of how to educate fashion design students in this environment is becoming an increasingly pressing one yet remains under-theorised and under-researched. Many fashion design degree programmes do successfully reflect debates around wider ethical issues concerned with sustainability, production and consumption (Fletcher & Grose, 2012). Yet, there are calls for sustainable fashion design

debates to better engage with a broader range of issues linked to social responsibility, ethics and politics (Busch, 2008). For example, how might issues of social justice in fashion design education address European colonialism and imperialism, economic exploitation and racial hierarchies related to dominance and control?

To understand more about the relationship between social justice and education, David Gillborn's book *Racism and Education* gives valuable insights. Gillborn argues that Western education systems are in fact structured in ways that reproduce racial inequalities through what he calls 'non-accidental' forms of unintended racism, such as in the design of curricula, assessment systems, the teaching of history or the ways different students are advised (Gillborn, 2008). How might such "non-accidental" forms of unintended racism manifest themselves in fashion design pedagogies? The investigation of this question lies at the root of this PhD project. Many fashion design projects briefs actively encourage engagement with cultural difference. As cultural diversity itself becomes increasingly fashionable, how should progressive forms of fashion design be taught?

To address the co-option of counter cultural critiques, such as cultural diversity, a number of scholars warn that a new critical awareness or a 'meta-critique' (McRobbie, 2016, p. 8) needs to be adopted; especially, in a context where subcultures themselves become commodified and eventually de-politicized (Ponzansei, 2014). Further concerns over the tokenistic nature of cultural difference can again mean that the structural nature of oppression can remain hidden (Ahmed, 2012). These problems are discussed by Sylvia Theuri who critiques approaches that seek to raise awareness of BAME artists and designers through art spaces such as INIVA (Institute of International Visual Arts) and New Art Exchange and the exhibitions africa 95 and africa05 (Theuri, 2015, p.67). Theuri argues these initiatives which showcase BAME artists and designers, rather than more directly address racial inequalities can only further marginalize BAME groups, excluding them from mainstream institutions (Theuri, 2015, p.67). Such concerns are further developed in the work of Sara Ahmed who contends that institutional policies which aim to promote diversity have little impact on racial equality (Ahmed, 2012).

Recognising these concerns is important because the tokenistic strategies that are often conveniently used in educational contexts form part of the discussions here. Racist processes in education result in: issues of inequality in art and design education, such as the difference in attainment for degree marks between BAME and white home students (Richards & Finnigan, 2015, p.5.); Eurocentric bias in curricula and resources (see 'Why is my curriculum White?); low level of BAME staff (Equality Challenge Unit 2014 in Richards & Finnigan, 2015, p.4); and, an environment where it can be very challenging for BAME students to gain entry to Higher Education courses (Burke & McManus, 2011). So, in what ways does racial bias manifest itself in fashion design and fashion design pedagogies? To address this question requires confronting issues of 'cultural appropriation', the use of exoticism, the 'Oriental Other' and varieties of racial stereotyping and micro-aggression in fashion design and image making. To further understand these issues, it therefore becomes increasingly important to understand how cultural hierarchies have, over many years, become embedded in fashion design cultures.

Addressing the role of hierarchies in fashion has resulted in an increasing recognition of the problematic nature of dominant fashion narratives that maintain that the West has fashion and the non-West does not (Niessen, 2003; Hoskins 2014). In the field of fashion studies, there has been a growing focus on the ways in which fashion produces racism; such as, through designs that culturally appropriate different cultures; the exclusion of non-white bodies in the fashion media and catwalk shows; and, the global dominance of European and America fashion design (Fung, 2006; Garconniere, 2010; Hoskins, 2014). Fashion scholars have specifically analysed structures of racism in fashion (Niessen, 2003; Cheang, 2014; Hoskins, 2014). Studies have begun to emerge, for example, which link key writings on fashion by early scholars to racist thinking (Gaugele & Titton, 2014; Sircar, 2014). Gaugele and Titton argue that some of the early influential work on fashion by Georg Simmel in 1904 is dominated by a 'colonial-racist theorization' which has established a,

colonially biased, modern fashion theory. For example, Georg Simmel's contemporary understanding of fashion was that it was limited to the higher levels of society, meaning Western civilisation. Based on a colonial-racist thinking, Simmel used terms such as "savages", "primitive races", and "primitive conditions of life" to describe colonized people, suggesting that such marginalized groups would be afraid of "anything new" (Gaugele & Titton 2014, p.165).

This work, from over a century ago, links fashion with modernity, progress and the West. Describing fashion as a 'Western regime', Gaugele and Titton investigate existing work on the history of fashion and textiles in India, historical alternative product cultures in the 1970s, government policies and representations of whiteness in fashion media imagery and art images. The authors conclude that a new understanding of fashion is needed to reflect the expansion of the global fashion supply chain and the increase of global retail outlets and media platforms. Sandra Niessen adds to this debate about how racial hierarchies structure fashion by focusing her analysis on non-Western fashion from Asia (Niessen, 2003). Niessen claims that non-Western fashion and clothing styles have been subject to fashion colonialist thinking which continues to affect both Western and non-Western designers.

This claim is supported by an academic study undertaken by Lisa Skov which argues that fashion designers in Hong Kong continue to feel that in order to gain success they need to produce fashion designs which draw on 'traditional Chinese' motifs instead of developing their own signature styles (Skov, 2003). Niessen suggests that such deeply entrenched cultural ideas of what does and does not constitute fashion represent the dilemmas in fashion design cultures today: how the non-West attempts to claim legitimate participation in fashion and how Western fashion attempts to appropriate non-Western cultural symbols. This dominant conception of fashion as a Western construct raises a number of important issues and challenges for contemporary fashion design education, some of which will be further explored as part of this PhD project. There is a need, for example, to identify how Eurocentric narratives dominate in fashion design project briefs and the need to examine the extent to which fashion resources used in the fashion design process reproduce these racial hierarchies. The next section will address some of the issues raised here by turning to the role that fashion design resources play in the design process. Drawing on my own experiences of teaching undergraduate fashion design in the U.K I will analyse the role of pattern cutting blocks in fashion design practice.

3 Eurocentric Bias in Fashion Design Resources

Issues relating to the prevalence of Eurocentric thinking are evident in the many resources employed in undergraduate fashion design education in the U.K. Some of these issues were encountered in a fashion project I have run several times on swimwear. The main resource and technique used in this context was a swimwear pattern block (figure 1). These blocks are used as a basic pattern from which variations of pattern designs can then be developed. In commercial production, patterns are made to fit standard body sizes and the usual procedure in the fashion industry is to work to a standard size 8 or 10.

Several issues were encountered during the design process in this swimwear fashion design project. Firstly, the swimwear blocks that were used only provide a pattern for one piece or two-piece swimwear garments and originate from European pattern blocks from the 1930s. These pattern blocks normalise standard body sizes in ways that exacerbate normative values around body image. Had a student wanted to design another type of swimwear, for example a burkhini or veilkini this resource would have been of little use (figure 2). How could these blocks support designs for people living in non-Western contexts where body-covering is the norm?

The veilkini or burkhini have become more mainstream in both the U.K and around the world. Indeed, the new Nike Pro hijab has been recently nominated for Beazley Design of the Year Award 2017 in the U.K. So, how could teaching resources have been more effectively deployed to offer alternatives to the normative values that are prevalent in such European pattern blocks? Did the lesson plan consider how some fashion design students, especially those from non-Western

backgrounds, might respond to a brief requiring them to design swimwear that promotes aesthetics of the body that they may disagree with? Echoing such concerns with the exclusionary aesthetics of

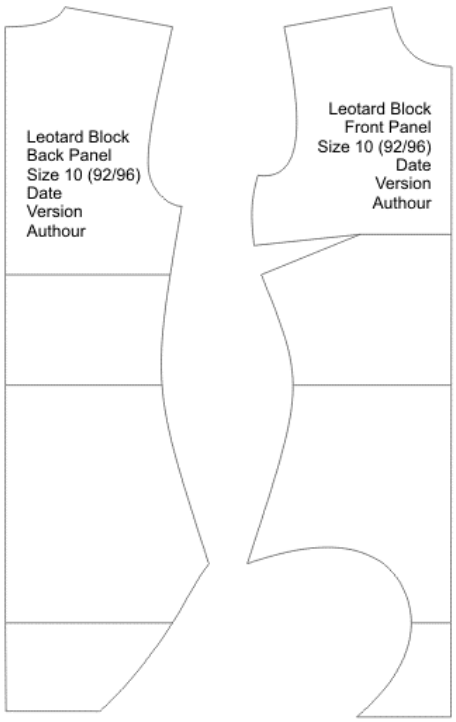

Figure 1 The 'leotard' block used in swimwear design. source www.pinterest.com.

Figure 2 An example of a veilkhini. source: www.aliexpress.com.

dominant fashion design, the fashion 'hijabi blogger' Dina Torkia recently reported that she took the decision not to study fashion design at university, "because I wore a scarf and that would be weird, I'd stick out" (Cochrane, 2015).

This example highlights just one of many possible ways that the fashion design process constructs and re-inscribes the normative values of Eurocentric culture. Paul Gilroy's important book 'After Empire' helps to open up this idea by showing how the legacies of colonial histories continue to exert influence in wider culture. Gilroy discusses the continued relevance of colonial history, asserting that, "ambiguities and defects of past colonial relations persist" and "amplify many current problems" (Gilroy, 2004:2). Therefore, does the use of pattern cutting blocks in fashion design programmes of study support the perpetuation of these historical power relations? Literature in this area of fashion design practice remains limited. Therefore, it is necessary to further challenge asymmetrical power imbalances at work in the fashion design education process through the development of new research and new curricula. The next section turns to how contributions from Black and Women of Colour feminist theories drawn from everyday experiences could open new possibilities to re-think fashion design pedagogies.

4 Decolonising Fashion Design

One approach to challenging racial inequalities that has been taken up by many Black and Women of Colour feminists including bell hooks (1994), Chandra Talpade Mohanty (2003), Heidi Safia Mirza (Mirza & Joseph 2013) and others, calls for the decolonization of "our minds and our imaginations" (hooks 1994, p.202). Theories of *decolonization* emerged from critiques of colonialism written by scholars including Frantz Fanon (1959), Chinua Achebe (1958) and Edward Said (1978). These theories problematize and interrogate the different ways in which Western colonialism exerts its global power both today and in the past; despite the end of economic and political Western colonialism, projects of coloniality endure through the continued production of hierarchies of culture and knowledge (Mignolo, 2012 [2000]; Maldonado-Torres, 2007). Therefore, by exposing historical power structures, processes of decolonization attempt to revive and expose hidden epistemologies.

hook's calls for decolonialization is rooted in a long tradition of feminist scholarship that argues how political issues cannot be addressed separately from the personal. In particular, debates in the fields of Marxist feminism (Carpenter & Mojab, 2017), care (Puig de la Bellacasa, 2017) and science and technology studies (Haraway, 1988) offer feminist critiques of patriarchal structures in society. While such feminist perspectives are undoubtedly important, the emphasis in this paper to challenge structural racism and cultural hierarchies stresses the value of Black and Women of Colour feminisms. Thus, hooks' decolonial approach has the potential to establish a politics of diverse representation which could both critique and integrate aesthetic ideals informed by racist standards, a system of valuation that would embrace a diversity of Black looks' (hooks, 1994, p.202).

To challenge racial hierarchies, Black and Women of Colour feminists including bell hooks, Audre Lorde, Heidi Safia Mirza, Sara Ahmed and Chandra Mohanty open up new possibilities because they foreground issues of race within biographical narratives (Mohanty, 2003; Lorde, 2007 [1984]; Mirza, 2013; Ahmed, 2017). These intersectional feminist writings have given legitimacy to me drawing on my own family biography in a fashion design context, reflecting on objects owned by my family, including family photographs, personal memories, narratives and garments. It has been especially useful for me to look at clothing that different members of my family who originate from India have worn. My family often discuss their memories of growing up in India and clothing has a deeply significant role. Feminist theory has helped me better understand how hierarchical orders continue to be applied in fashion cultures.

Fashion's reliance on aesthetics underpinned by racist currents means that a decolonial approach potentially offers a broader agenda that exposes structural inequalities and also ways of resisting them. Chandra Talpade Mohanty, drawing on the seminal work on Franz Fanon, details the

decolonization project as involving "profound transformations of the self, community and governance structures" (Mohanty, 2003, p.241). Therefore, decolonizing fashion requires not only students and educators to re-think fashion design but also wider society and the ways in which fashion is produced and consumed. Mohanty calls on those practicing decolonization to actively withdraw and resist structures of "psychic and social domination" through "self-reflexive collective practice" (Mohanty, 2003, p.241). How might fashion design educators develop self-reflexive approaches in fashion design pedagogies? Is this what decolonial fashion might look like?

In my own work on this issue I have drawn particular inspiration from the seminal work *All About Love* by bell hooks. Written at the beginning of the new millennia in the year 2000, this book has especially resonated with me because it emphasises alternative and more equitable ways for how human beings can relate to one another. hooks suggests this requires using love as a 'transformative power' (hooks, 2000, p. xxix). How might re-imagining human relationships and the role of love contribute to new forms of fashion design pedagogies? Could such an approach help create more inclusive fashion design practice that withdraws from Eurocentrism?

In the book *All about Love*, hooks calls for a re-definition of love which presents it as a profound emotion deeply rooted in both politics and society. According to hooks, love is defined as consisting of "care, commitment, trust, responsibility, respect and knowledge" (hooks, 2000, p.94). This definition gives agency to the concept of love, giving it an active role to play. Therefore, understanding the full dimensions of love shows it in contrast to a more popular perception in society that associates love as romantic, heterosexual and passive with a focus on individualism. A narrow understanding of love therefore prevents people in society from fully realising their full potential and ability to make one another happier through solidarity. hook's key argument is that her re-definition of love should be seen as an agent for social justice to help end "dominance and oppression" in society (hooks, 2000, p. 76). hook's concept of love therefore offers hope and possibilities for alternative ways to challenge societal inequalities through positivity and optimism.

hook's notion of love also has the potential to be utilised to foster students' active awareness of how local and global cultures and histories might be more creatively interwoven, to create a design process that resists stereotyping, appropriation and racist forms of representation. Adopting this approach in fashion design education, instead of abstract ahistorical approaches, orients educational experiences on historical and biographical specificities and differences. This approach could therefore provide points of disconnect between communities as wells as connections.

Developing this notion of solidarity in pedagogy, Mohanty proposes a pedagogical strategy called 'The Feminist Solidarity or Comparative Studies Model' (Mohanty, 2003). This strategy, I suggest, has the potential to be taken up by fashion educators to help encourage students to explore points of connection and disconnection between different cultures and histories. This approach could, for example, help educators challenge the uncritical spaces currently being produced as a result of the disengagement from socio-cultural contexts in fashion design education. Adopting this kind of decolonial approach therefore has the potential to encourage a new fashion design process. The aim is to enable fashion educators and students to understand that fashion is not a politically neutral process. This final part of this paper will now outline a workshop that used these theories to re-think the fashion design process in undergraduate fashion design education: "All About Love": Fashion designing for someone you love.

To begin the fashion workshop, I asked students to think about five people they loved. Drawing on hook's concept of "love", I asked students to think about love in the broadest sense to challenge dominant and narrow hetero-normative concepts. Students were asked to consider people they had loved from their family, such as parents and extended members to lovers and friends. I shared five images of people who I loved, including my Great grandparents (who I have never met as they had died before I was born), my mother, and my friend's baby. Therefore, I was presenting the bodies of the elderly, the very young and a woman in a hijab (my mother); bodies that do not necessarily

subscribe to Western normative ideas of fashion culture. I also highlighted how my Great grandfather wore the lunghi and my great grandmother wore a sari all her life to challenge the domination of Western clothing in undergraduate fashion.

Next, students were led into a discussion about the types of bodies that they design for as part of their undergraduate fashion education. All replied that their classes thus far had predominantly focused on designing for standard sized female mannequins. A few students remarked that they had indeed designed garments for friends and family, but that this had never been as part of their fashion design education. Instead, the domination of the mannequin in fashion design education means that the design process is dominated by female bodies that are sized 8 or 10. I then asked students if they had ever designed garments for any of the people they had listed as people they "loved"? A few students replied that they did indeed think about a lover or a sister when designing, but the majority fell silent remarking that they had never considered designing for a grandparent or a younger family member. Why, I asked, are they then mostly designing for an imaginary sized 8 female? The room once more feel silent.

The second part of the class then required students to work with a tutor in textiles and use a variety of materials to consider ways to design for the bodies that they identified as ones that they "loved". Working in groups, many students described feeling strong emotions as they began for the first time to design with an alternative set of design criteria, where aesthetics were no longer the most important feature to consider in their fashion designs. Many told evocative stories of the person who they were designing for whilst they were manipulating fabrics. For example, one student thoughtfully considered the effects of time on her grandparent's body and used padding to re-create the effects of an aged body (see figure 3).

Working in a group, this student's remarks prompted a conversation between participants on the physical consequences of aging on human bodies. Despite the age group of these students being less than thirty years old, all reflected and discussed people they knew whose bodies were older and even elderly. For example, one student discussed how her mother's body had changed after child birth and another mentioned how her grandmother's skin had begun to sag under multiple layers of skin. Using wadding, this group then begin to change the mannequins standardized features and add layers to represent folds of additional skin. They then used textiles to cover this 'time worn body' and develop a new fashion design. In this way the group of fashion students were beginning to consider creative ways to challenge hegemonies around body normativity in fashion. However, working on a standard sized female mannequin meant that conversations around the hierarchies of gender and body ableism were absent.

Another group of students were encouraged by one member who spoke emotionally as she experimented with ideas for a design for a member of her family disabled through illness. This student discussed how her relation was unable to fully participate in fashion due to the dominant structures of body normativity which render bodies with disabilities as absent from fashion cultures. To explore asymmetric bodies and fashion, this group of fashion students worked on each other's bodies to develop new fashion styles. With the use of wadding again, they manipulated one member's body to extend features and provide an alternative to normative body shapes and sizes. This figure was then wrapped with textiles to explore draping methods as an alternative to tightly structured and sewn garments which dominate many forms of Western garment construction.

Figure 3 'The Time Worn Body'.

Adopting these approaches in the context of fashion design education, opens up the possibility of re-orienting educational experiences on historical and biographical specificities, points of connection and disconnection between communities and possibilities for struggle and resistance against forms of cultural hierarchies. More work will need to be undertaken to research into other decolonial strategies and the advantages and disadvantages of such approaches. Decolonization is an ongoing project but in the context of this research it might enable fashion educators and students to see that fashion is not politically neutral and needs to take more account of how cultural and racial bias is constructed in the design process.

Returning to hook's decolonial framework of 'love', new ideas for fashion curricula could offer opportunities to interweave different fashion histories, economies and politics in alternative ways to find commonality. I want to test whether such an approach has the potential to encourage educators and students to focus on points of connection and disconnection between the racial and cultural identifications that circulate in the design process and to therefore devise new pedagogical agendas. In this way fashion design education might offer a space to counter alternatives to the hetero-normative, gendered, racialized, and ableist normative contexts prevalent in mainstream fashion cultures.

5 Conclusion

This paper has set out to explore the potential of adopting a decolonial approach to teaching fashion design in the U.K and the extent to which this approach could offer opportunities to challenge racial bias in fashion design education. Despite the limitations of the research undertaken so far, the study has begun to deconstruct the fashion design pedagogical process. The urgent need for more social justice oriented and pluralistic fashion design education has precedents. In her recent book Be Creative, Angela McRobbie asserts that through the post war years, fashion design education in the UK was underpinned by social democratic and radical values, for example, through "radical political perspectives such as anti-racism, multiculturalism, feminism, anti-poverty issues etc" (McRobbie, 2016, p.161).

Drawing inspiration from these contexts, the next step in this research will now be to experiment further with hook's framework and to continue to develop strategies for a more inclusive and racially progressive form of fashion design education. The project will also need to open to the possibility of discovering other counter-racist approaches to fashion design. The possibility of cultivating such alternatives will also be further investigated in the next phase of this project which aims to create educational resources to support fashion design educators. The challenge here will be to encourage new and more equitable forms of fashion design. Approaches here could include:

- Exposing fashion design students to more diverse sets of fashion resources from non-Western sources.
- Reflecting on the "transformative potential" of interventionist strategies.

The aim here would be to show that alternative ways of teaching and learning fashion design are not just desirable but perfectly possible. Fashion theorists have only travelled so far in this journey, but many educators have in many ways already gone much further when it comes to re-imagining fashion design education beyond the limitations of dominant contemporary fashion cultures.

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Learning from Feminist Critiques of and Recommendations for Industrial Design

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This paper shows how a feminist perspective can inform industrial design theory and practice. It provides a list of feminist-informed critiques and proposals toward industrial design based on a literature analysis of existing feminist work in industrial design and analysis of three feminist-driven co-design projects. The results show that a feminist perspective identifies systemic problems in industrial design based on the presence of power and masculinity, unequal power dynamics between people and negative situations facing women. These problems appear at the multiple levels of industrial design and are a theme throughout feminist critiques in the field. In turn, feminist recommendations are typically grass roots, relying on actor interventions that draw on women's perspectives and/or feminist perspectives. These results offer a range of contributions to industrial design. Broadly speaking, they offer an alternative perspective to industrial design to help the field move forward and respond to social imperatives. The specific critiques and recommendations can also be broadly applied, as they pinpoint problems within the field and guide alternative practices.

feminism; industrial design; literature analysis; co-design

1 Introduction

There have been many claims in the past few decades about the end of feminism and of its relevance where, for instance, "feminism is [perceived to be] unfashionable, passé, and therefore not worthy of serious consideration" (Gamble, 2006, p. 38). In these situations, it has been claimed that feminism has achieved its goals and continued action is trivial (see, for example, Hill, 2015) or is, at the extreme, a form of entitlement or bullying against men, as claimed on sites like A Voice for Men (www.avoiceformen.com). However, feminist activity is still going strong. Major celebrities like Beyoncé, Emma Watson and John Legend (Lindner, 2014) and even male heads-of-state like Justin Trudeau (Office of the Prime Minister, n.d.) and Barack Obama (Obama, 2016) are self-proclaimed feminists. They have noted many remaining feminist concerns including the representation of women in positions of political power, equal pay, gender stereotypes and sexual harassment and objectification (Lindner, 2014; Obama, 2016; Office of the Prime Minister, n.d.). The broader public has also repeatedly mobilized to support feminist initiatives. This includes the Pussy Hat Project

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(www.pussyhatproject.com) and the recent #me too campaign that flooded social media and the public consciousness.

Broadly speaking, feminism is based on a social justice premise that women live in unjust conditions, which can and should be changed (McCann & Kim, 2010). Operationally, feminism can be seen as an ideology, a conceptual framework that helps us navigate and act in the social and political worlds (Freeden, 2003; Goodwin, 2007; Van Dijk, 1998). In this sense, feminism could be seen to operate as a lens that guides thinking and action.

Diverse members of society apply a feminist lens in their private and public lives. However, issues of feminist concern permeate all levels and parts of society, which also includes professional fields like politics, economics, medicine and sports (Walby, 2011). Feminist work extends to these arenas and there is a history of feminist initiatives in a range of professional fields (Walby, 2011). Design and, specifically, industrial design is no exception. There is a relatively long and diverse history of feminist work in industrial design. This includes theoretical investigations, design research and feminist-informed practice, where many examples are documented in academic articles and books.

This paper is situated at the intersections of feminism and industrial design; it focuses on feminist work in industrial design and its value and contributions to industrial design theory and practice. Specifically, it investigates the lessons that can be learned from feminist critiques and proposals toward industrial design.

I conducted this research as part of my doctoral studies at the Université de Montréal, supervised by Anne Marchand. Given my background, this study is anchored in a Western context, which comes across in the planning, execution and results. Further, feminism is a complex topic where no discussion could adequately represent its many forms, roles, applications and perspectives. Similarly, industrial design is a large and rich field. This project is based on a broad and general understanding of feminism and industrial design, and looks for generalizations about their intersections. Together, these factors show that this research project represents a limited and partial perspective, despite its many contributions. Future studies from different contexts and with different treatments of feminism and industrial design would offer valuable contributions to this research topic.

2 Theoretical foundations

In this study, I focused on feminism as an ideology, which guided my understanding of its operations. This includes its operation as a lens, mentioned above, but also its processes of critique and proposal. Ideologies often hold and help work toward a vision of a model society (Sargent, 2013). Broadly and generally speaking, a feminist perspective envisions a society based on a form of equality and justice for women. It then guides processes of critique and action to achieve this vision. For example, a feminist perspective could help identify and explore the range of issues that negatively effect women and establish and carry out plans for change with the broad goal to improve women's lives (McCann & Kim, 2010).

When applied to industrial design, a feminist perspective and its processes of critique and action could offer a range of valuable insights. For instance, it could highlight problems in industrial design and suggest changes that respond to these problems. These insights could be applied to industrial design theory and practice to help align industrial design with feminism and its social goals. The resulting changes could inform greater social responsibility in the field by identifying and addressing issues surrounding women's conditions.

In addition to these general statements surrounding the contributions of a feminist perspective to industrial design, a deeper investigation of its operations and areas of attention help identify likely subjects of its critiques and the focus of its recommendations. To begin, as a sort-of conceptual framework or lens, feminism could be seen as a relatively holistic perspective that can operate at many levels. It has many potential points of intersection with industrial design: it promises to offer critiques and recommendations at multiple levels.

Beginning with its potential critiques at an epistemological level, a feminist perspective is known to be critical of presumed universal knowledge (see, for example, Haraway, 1988). It explains that knowledge and truth are not universal and, instead, are "partial, situated, subjective, power imbued and relational" (Hesse-Biber, 2007, p. 9). Further, it claims that women's needs and perspectives are not always incorporated in dominant knowledge (Hesse-Biber, 2007).

A feminist epistemological perspective also tends to challenge the masculinity of knowledge and systems. The categories of masculine and feminine refer to genders fostered through the social world (Marchbank & Letherby 2007). Typically and traditionally, feminine and masculine genders and their characteristics are seen to be distinct and binary. The Bem Sex Role Inventory (1974) is a psychology framework that categorizes American gender characteristics based on a study of socially desirable traits for females and males (Bem, 1974). For example, it notes that feminine characteristics include loyalty and affection, while masculine traits include ambition and competition (Bem, 1974). Masculine and feminine are also associated with more abstract concepts. For instance, the masculine is associated with order and linearity and the feminine is said to emphasize process, dialog and the whole (Wilshire, 1989).

At a more concrete level, a feminist perspective could be critical of situations involving the inequality, injustice and oppression of women.

In response to its epistemological challenges to universal and masculine knowledge, a feminist perspective could encourage the incorporation of many perspectives in knowledge and knowledge building, including women's perspectives (Haraway, 1988; Hesse-Biber, 2007). This range of perspectives would help provide richer and more complex knowledge (Haraway, 1988; Hesse-Biber, 2007). At a more concrete level, a feminist perspective could also provide responses to its critiques of situations that negatively effect women. These responses could represent a more equal and just situation for women.

2.1 Implications for industrial design

Feminist critiques and proposals at these various levels could apply directly to industrial design. Feminist epistemology promises to show that many aspects of industrial design are gendered and masculine. In response, feminist epistemology would likely suggest opening the field to new perspectives including women's perspectives. At a more concrete level, a feminist perspective could identify situations in industrial design involving the inequality, injustice and oppression of women. In response, it could guide solutions to these issues based on a form of equality and justice for women.

As mentioned earlier, these critiques and proposals could provide lessons for industrial design theory and practice. For instance, they promise to highlight issues in industrial design, pitfalls that designers ought to avoid. They could also propose solutions to these issues that could be broadly applied. This work could help align industrial design with feminism and its social goals and inform greater social responsibility in the field by identifying and addressing issues surrounding women's conditions.

3 Research focus

This paper provides a list of feminist critiques and proposals toward industrial design and a discussion about their value and contributions to industrial design. It moves beyond the hypotheses about feminist critiques and proposals toward industrial design provided above and presents real-life examples.

As mentioned, there is a relatively long and diverse history of feminist work in industrial design. That said, few works provide a meta-review and analysis of the intersections and interplay of feminism and industrial design, as done here.

4 Methods

4.1 Literature analysis

The first method draws on the existing feminist work in industrial design. It involved a literature analysis of the range of writing involving the intersections of feminism and industrial design. These works were identified through Google and the book and article catalogues at university libraries in Montreal. The search used the keywords feminism and feminist along with industrial design and design, and their French translations. Combining Google with more formal and academic databases helped identify a broad range of literature including books, articles, theses and dissertations, blogs and interviews.

More than 50 texts were identified and included in the analysis. The analysis was based on a general inductive and comparative approach to qualitative data analysis (Merriam, 2009), specifically thematic analysis (Mills, Durepos & Wiebe, 2010; Schwandt, 2007). It involved reviewing each text for instances of feminism and mention of industrial design, identifying intersections between each and then looking for critiques and proposals relating to industrial design at each point. I situated each critique and proposal based on the text's context (i.e. time and place), the type of feminism it applied and the aspect of industrial design it addressed. This categorization was based on a framework of feminism and of industrial design, presented in the next section. As a last step, I reviewed the variety of critiques and proposals and organized them into categories and looked for emerging themes.

4.2 Analytic frameworks

The following is a brief introduction to the analytic frameworks mentioned above. The discussion begins with an overview of the framework of feminism. This is followed by the industrial design framework.

4.2.1 Framework of feminism

All ideologies, including feminism, are based on several core concepts that are, for the most part, shared by all adherents (Freeden, 2013). However, there are different variants of each ideology that can prioritize certain core concepts over others or inject additional peripheral concepts (Freeden, 2013). When this happens, the general ideology can be understood as an ideological family with a series of sub-ideologies (Freeden, 2013), sometimes referred to as ideological strands. Feminism is no different. It includes many ideological strands like radical feminism, eco-feminism and postcolonial feminism. For the analysis, I categorized the feminism behind each critique and proposal based on an understanding of the core concepts held by the feminist ideological family and its series of strands.

4.2.2 Framework of industrial design

The categorization was also based on a framework of industrial design. The framework applied here is an amalgamation of the writing of several key design theorists. A major component includes Dorst's model of design activities he presented in several of his publications and in detail in *Design Expertise*, a book he co-authored with Lawson (2009). This is supplemented with a range of theory on design projects from Boutinet, Findeli, Bousbaci and Vial.

The model includes different categories and levels of design activity moving from large-scale to small-scale.

Table 1 Industrial design framework.

<table>
<tr><td colspan="2">Design profession: Profession refers to the range of design organizations (institutions, associations, and consultancies), design knowledge and theories, and the entire population of designers (Lawson & Dorst, 2009).</td></tr>
<tr><td colspan="2">Practice external to a project: Design practice refers to the place and role of each individual in the larger professional community (Lawson & Dorst, 2009). It refers to their professional identity like their relationships with other practitioners and factors like style, attitudes and interests that they bring to their work (Lawson & Dorst, 2009). It also refers to their activities including design work outside a project (e.g. developing a company vision or hiring employees) and design work in a project (Lawson & Dorst, 2009).</td></tr>
<tr><td rowspan="3">Design project: The design project is the structural unit of design practice (Vial, 2014). It involves the activities to develop an object and ends with the establishment of a prototype (Boutinet, 2012). Its components are design practice, process and objects.</td><td>Practice in a project: This is the application of design practice in a design project, as introduced in the previous category (Lawson & Dorst, 2009).</td></tr>
<tr><td>Processes: Design processes are the methods (Lawson & Dorst, 2009)</td></tr>
<tr><td>Object: The object is the “product of the design project” (translation by author; Findeli & Bousbaci, 2005, p. 42).</td></tr>
</table>

In addition to these categories, the framework also included ‘other projects’ like production, marketing and object reception. Feminist contributions to industrial design pertain especially to its social relationships and contexts, so it’s appropriate to consider related projects that follow industrial design as extensions of this framework. These subsequent projects align with Boutinet’s broad definition of a project and may include similar structural components to design projects including the actor, process and object realms. As an example, the project of object reception would involve the design artefact, its user and the user’s actions (Findeli, 2004; Findeli & Bousbaci, 2005).

4.3 Project-grounded research

In contrast to the literature analysis, the other method and data source was more exploratory and was based on project-grounded research (Findeli, 2004). I facilitated and analysed three feminist-driven co-design projects with members of a feminist creative organization in Los Angeles. Participants worked from their feminist perspectives throughout each project and allowed it to guide their thinking, decision-making, interactions, etc. Details about the project were recorded through group and individual documentation.

At the end of each project, the participants and I discussed how the feminism intersected with the project. I also conducted a thematic analysis of the project documentation and of notes from the final group discussion following a similar approach to the literature analysis. It involved reviewing the documentation for instances of feminism and mention of industrial design, identifying intersections between each and then looking for critiques and proposals relating to industrial design at each point. As an example, a critique could be a situation where a participant challenged a design process or an assumption in product development. In turn, a recommendation could be a situation where a participant expressed a preference for a particular process or object characteristic. Next, I situated each critique and proposal using the feminism and industrial design frameworks. As a final step, I reviewed the variety of critiques and proposals and organized them into categories and looked for emerging themes.

My research focused on the outcomes of each method, as well as trends across their results. This paper focuses mainly on the results of both methods combined.

5 Results

This section presents feminist critiques and proposals toward industrial design identified through my research. However, before entering the heart of this section, the next section includes a brief discussion and contextualization of the results from each data source.

5.1 Differences between the data-sources

The literature analysis and project-grounded research provided distinct results. This is related to the context of the feminist perspective and its application to industrial design. The literature addressed the range of levels of the industrial design framework and represented a wide variety of feminist strands, coming from different contexts and time periods. There were also more critiques than recommendations for change. In contrast, the intersections of feminism and industrial design in the co-design projects centred on the design project. While there were few explicit critiques, feminist perspectives guided the design practice. Its orientations and preferences can be interpreted as feminist recommendations to industrial design. Finally, there were less examples and less diverse feminisms than represented in the literature, but each co-design project was a rich source of information and an example of contemporary, applied feminism.

Each method was very different and had its strengths and weaknesses. Yet, the strengths of one helped make up for the weaknesses of the other. For instance, the quantity of literature helped compensate for the limited number of co-design projects. Further, the depth of interrogation in the project-grounded research helped compensate for the sometimes-limited detail in the literature.

5.2 Similarities within the results

Despite the differences between the two research phases and their results, the outcomes aligned well and conform to certain broader trends. Despite the incredible diversity within feminism, feminist critiques can often be traced to common and consistent issues that simply materialize differently in different contexts. These systemic problems include: the presence of power and masculinity, unequal power dynamics between people and negative situations facing women. A feminist perspective identifies incarnations of these problems at the range of levels in the industrial design framework. This dynamic is illustrated in Figure 1.

In turn, feminist responses touch on the multiple levels of the industrial design framework. However, there appears to be a preference for grass-roots action relying on actor interventions that draw on women's perspectives and/or feminist perspectives. These actors could include designers, users or other individuals involved in a stage of the design project or subsequent projects. This dynamic is illustrated in Figure 2.

Beyond these broader trends, specific feminist critiques and proposals at each level of the industrial design framework are provided in Table 2. This table follows Figures 1 and 2. The critiques and proposals are coded with letters A-L, which refer to specific positions on the figures.

Together, these critiques and recommendations also conformed with and confirmed the hypotheses that feminist epistemology would show that many aspects of industrial design are gendered and masculine and would recommend opening the field to new perspectives including women's perspectives. As suggested, they also identified situations in industrial design involving the inequality, injustice and oppression of women and guided solutions based on a form of equality and justice for women.

These trends and the majority of the critiques and proposals apply to the range of feminist perspectives. However, as explained earlier, there are a variety of feminist perspectives and I associated each critique and recommendation with a feminist strand. In some situations, a critique or recommendation is specific to a certain feminism, as discussed in the section that follows.

5.3 Differences based on the feminist perspective

This section discusses some of the differences within the results based on the feminist perspective applied in each example. First, most of the feminist recommendations involve drawing on women's perspectives and/or feminist perspectives. That said, cultural feminism, eco-feminism and, generally, less postmodern feminist perspectives tend to characterize a women's perspective, something that other feminisms don't typically do. There is generally an especially pronounced link between women's and feminist perspectives and the feminine in cultural, eco- and less postmodern

feminisms. Similarly, different feminist perspectives also informed the definition of women, the point of focus of many feminist critiques and recommendations toward industrial design. As an example, intersectional feminist perspectives were concerned with the needs of diverse women working in design or using design products, whereas cultural feminisms focused on relatively non-diverse, female and feminine designers and users.

Beyond the basic concern for issues like inequality, injustice and oppression, different feminist perspectives understood the causes of these issues in different ways and some put forward additional points of focus. These additional concepts, their levels of emphasis and their levels of priority varied between examples. For instance, an eco-feminist perspective has a relatively strong emphasis on the environment, a socialist feminist perspective is concerned with the economic world and third wave and intersectional feminist perspectives are concerned with the needs of women and other disadvantaged populations.

Varying levels of radicality were also present in the data and impacted the depth of interrogation and the extent that the recommendations were similar to the status quo. More radical feminist perspectives tended to interrogate industrial design at more abstract and deep-rooted levels and likely inspired more extensive and different recommendations.

Certain of these differences are represented in the figures and tables that follow. However, as mentioned above, this results section focuses primarily on broader insights and generalizations across the data.

5.4 The problems feminism finds with industrial design and the recommendations it proposes

As mentioned above, the results are presented in two phases. This begins with two figures that illustrate broader trends in feminism's critiques and recommendations toward industrial design. The figures are followed by a table that illustrates specific feminist critiques and proposals.

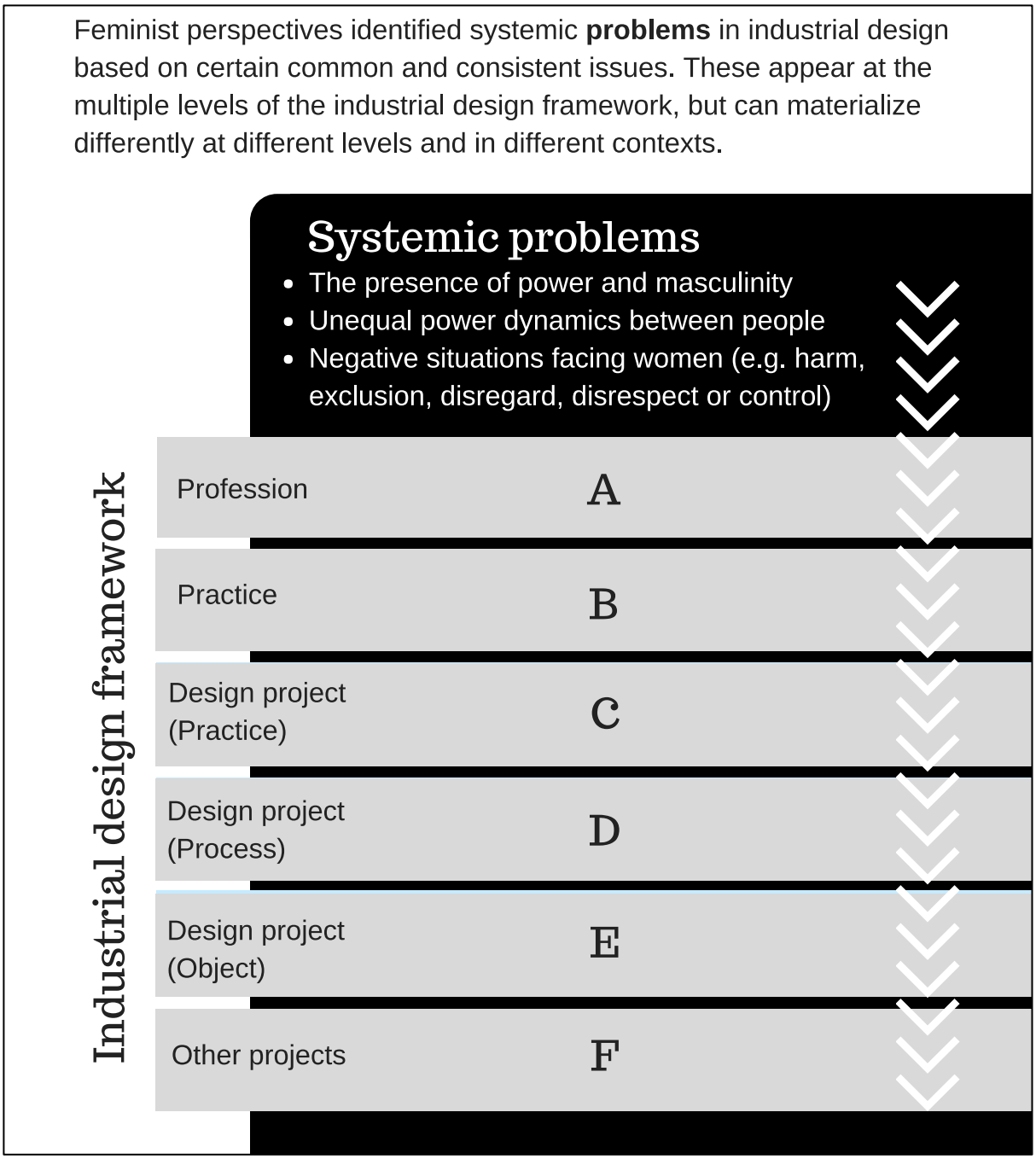

Figure 1 The system and context behind the problems feminist perspectives find with industrial design

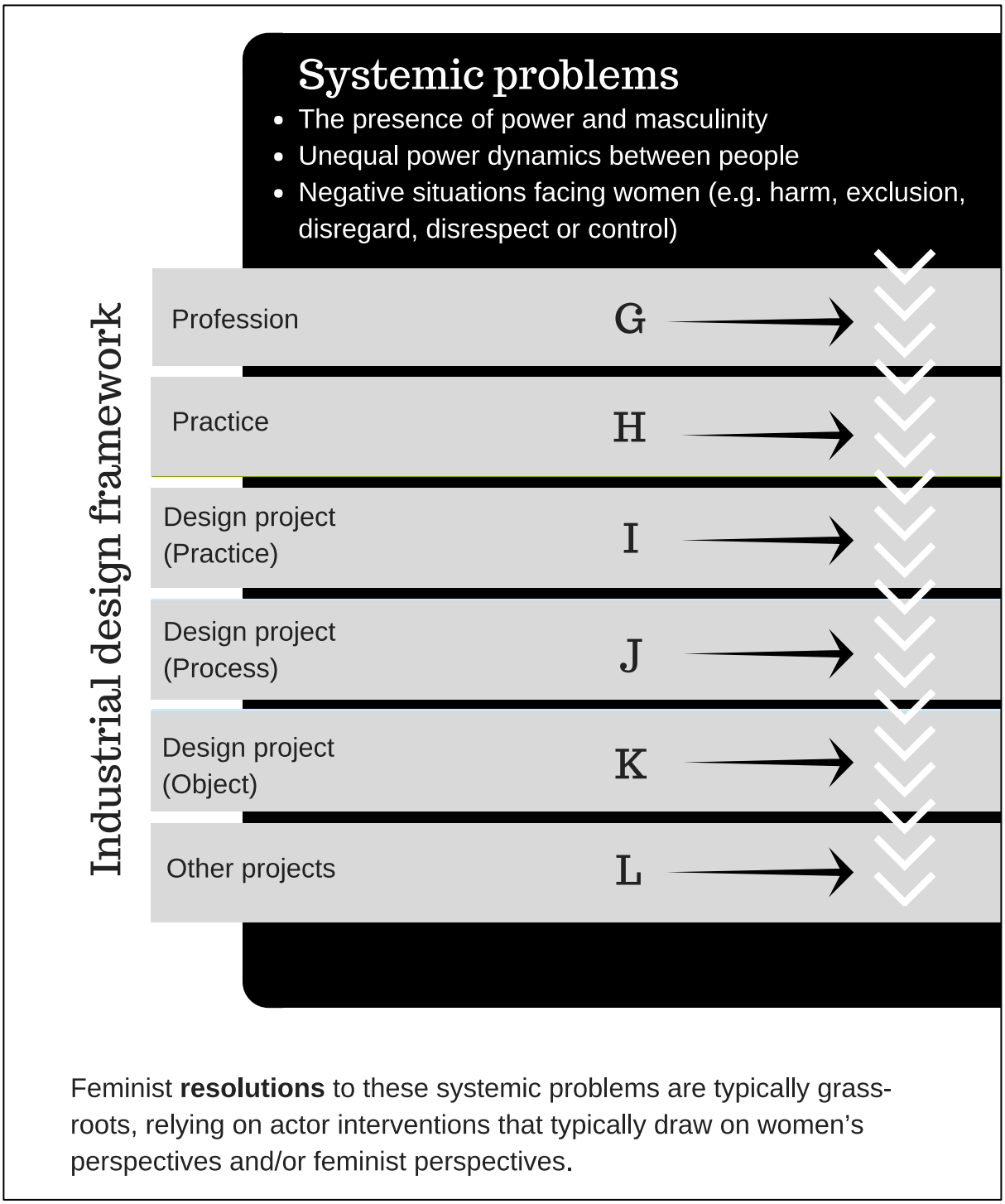

Figure 2 The system and context behind feminist proposals for industrial design

Table 2 Summary of the problems feminist perspectives find with industrial design and the recommendations they propose

Critiques	**A: Profession**
	Industrial design's rooting in modernism • As an example, Sparke (1995) explained that design movements and tastes are gendered and political where modernism is a masculine and patriarchal design style: it is a "'high-minded', authoritarian, and heavily politicized programme of architectural and design intervention and reform, based on rational principles" (1995, p. vii). Sparke also explained that modernism rejects feminine taste and minimizes women's power through its rules for good design that minimize the typically female consumers' creativity and agency (1995). Industrial design's rooting in the marketplace (this critique can be more or less extreme depending on the feminism applied) • One of the most extreme examples comes from a socialist feminist perspective, which argued that the industrial design profession as a whole including its foundations and its activities is problematic because it perpetuates inequalities through its associations with capitalism (Cole & Dahl Crossley, 2009). **Specific to eco-feminism** Industrial design's relationships with the military and corporations • This critique can be found in a short text written by Amon (1999).
Recommendations	**G: Profession**
	Realignment of industrial design toward postmodernism • Sparke was cautiously hopeful that postmodernism could enable positive changes by challenging design rules and norms and engaging with more feminine aesthetics (1995). Realignment of industrial design toward social and sustainability concerns • As an example, Rothschild proposed a balance between market priorities and contextual, social and sustainability concerns (1999).
Critiques	**B: Practice**
	The power and masculinity present in industrial design does not leave a clear place for female design professionals and can make female designers feel uncomfortable in their roles • There is a large body of work that explores this issue. Many of these texts seem inspired by Buckley's 1986 article, "Made in patriarchy: Toward a feminist analysis of women and design." Buckley explained that "[p]atriarchy has circumscribed women's opportunities to participate fully in all areas of society and, more specifically, in all sectors of design, through a variety of means-institutional, social, economic, psychological, and historical" (1986, p. 4). This guides perceptions of women's skills and roles and the tasks women are best suited to (Buckley, 1986). This also applies to other projects and institutions in the design community like design scholarship and design education • As an example, Clegg and Mayfield were critical of the longstanding associations between women and decorative arts and men and technology (1999). They explained that these associations carry into design education where women tend to choose softer design fields like textiles and jewellery as opposed to harder fields like product and furniture design (Clegg & Mayfield, 1999).
Recommendations	**H: Practice**
	Inject women into industrial design as active, empowered, recognized and respected actors that work from their point of view as women and/or as feminists • This is the implicit or explicit goal of many texts, including works by Martínez (2007), Attfield (1989) and Bronet and Layne (2010) that are discussed below. Support these women through affirmative action and targeted professional associations and competitions • For instance, Martínez suggested establishing "organizations created exclusively for female designers, shops where items were exclusively designed by women, special issues of magazines, e-mail lists about female designers, and design groups composed entirely of female designers" (2007, p. 19).

	Design scholarship, including design history, should focus on women in design and their interests and experiences, and apply feminist methods • For example, Attfield sought to broaden the scope of design histories to include more women and recommended that design historians identify female designers to serve as role models (1989). However, in order to make a large impact, she noted that design historians must also address the way history is told at a more methodological level (Attfield, 1989). Change the focus and content of design education to include more feminine and feminist content • As an example, Bronet and Layne suggested that a gender balance in design could be supported through design education (2010). This could involve empowering female students and teaching to feminine and masculine interests and values (Bronet & Layne, 2010).
Critiques	**C: Project (practice)**
	The power and masculinity present in industrial design does not leave a clear place for female design professionals and can make female designers feel uncomfortable in their roles • Many of the examples of critiques pertaining to practice external to the project also apply here. This includes Buckley's writing (1986) and the work it inspired.
Recommendations	**I: Project (practice)**
	Inject women into industrial design as active, empowered, recognized and respected actors that work from their point of view as women and/or as feminists • Like this proposal regarding design practice external to the project, there is a variety of literature that supports this recommendation. As an example, Perkins stressed that women should be active in designing products for female users, since their own experiences could inform products and new feminine visions "of what is aesthetically pleasing, [and] of what is most comfortable and easy to use" (1999, p. 125). Work outside traditional professional and consumer structures • As an example, Rawsthorn noted that new design technologies and contexts of practice can empower female designers: "[t]he possibility of raising investment from crowd funding, publicizing work on social media and selling it online is enabling a new generation of designer-entrepreneurs to pursue their own objectives by operating independently" (2014, para. 14). Engage in non-hierarchal interdisciplinary collaborative work • These arguments are seen throughout Rothschild's writing (see, for example, Rothschild, 1995).
Critiques	**D: Project (process)**
	Rigid and linear design thinking • This is an implicit critique, based on support for a problem-setting approach to design thinking seen during the co-design projects. Hierarchal and patriarchal group dynamics in collaboration • This critique can be seen in Rothschild's writing (see, for example, Rothschild, 1995). Reliance on technology like computers and hand-tools • As an example, this was noted by Clegg, Mayfield and Trayhurn who saw industrial design and its associations with technology, hands-on activities, hand tools and getting dirty in the workshop as masculine (1999).
Recommendations	**J: Project (process)**
	Apply design thinking based on problem setting • The design thinking in the co-design projects followed problem setting, which is a systemic and complex approach to design thinking. Many of the participants complimented this approach for its feminist associations. Apply methods like user research, co-design and participatory design, inclusive design and critical design • For example, Rothschild noted that feminism guides the use of design activities that incorporate and respect users like user research and participatory methods (1995). Interrogate and modify existing design methods based on feminist perspectives

	• As an example, this is seen in Prado de O. Martins' suggestions for critical and speculative design (2014). Co-design should involve an equal and respectful collaborative group dynamic where each group member applies their individual perspective and expertise • Discussions throughout my co-design projects showed that feminism supports a respectful and relatively equal collaborative process, but also a dynamic where each group member draws on their individual strengths. This provides a balance between feminism's emphasis on equality and the collective with its other focus on independence and self-expression. Engage in self-reflection about power and position throughout co-design projects • This point was identified during the co-design projects, as it was key to maintaining the balance between collaboration and independence during group work. It also helped ensure a relatively equal power dynamic between group members. Embrace new technologies like 3D printing and define their meaning based on feminist perspectives • For instance, although Clegg, Mayfield and Trayhurn where concerned that gendered design competence could be exacerbated by increasing computerization and technologization, they noted that digital design processes were a recent phenomenon and may be open to new gender readings (1999). Pay attention to the working environment and choose a space that would be empowering to the design team • Participants in each co-design project stressed the significance of the working environment. An empowering environment has a positive impact on the project by supporting and inspiring team members.
Critiques	**E: Project (object)**
	Design objects created for a 'typical' male user and based on masculine aesthetics • For instance, Vostral and McDonagh were critical of products designed primarily for an able bodied male user, which ignores the needs of other users including women and makes them accommodate to objects and their surroundings (2010). Design objects that ignore female users and their needs • Vostral and McDonagh's arguments (2010) could also apply to this critique. Design objects that perpetuate unequal social dynamics • As an example, Ehrnberger, Räsänen and Ilstedt explained that gendered product language reinforces gender norms, roles and hierarchies (2012). Design objects that gender or sexualize women outside their own terms • For instance, in "Representations of women and race in the Lancastershire cotton trade," Mumby was critical of the export of cotton from Britain to India and China in the 19th century (1989). She critiqued the prints on the cotton and its advertising, since it depicted troubling scenes that sexualized women and that represented power dynamics between colonists and colonies (Mumby, 1989). One dimensional design objects • The project-grounded research showed that feminism offers an implicit critique of industrial design's relatively narrow focus and could teach design to consider and operate at additional, more complex levels. **Specific to socialist feminism** Design objects that perpetuate and enable an economic system that controls or exploits women • Several texts challenge the assumptions and motivations behind certain design objects. For example, Graves was critical of women's domestic responsibilities and related domestic products like washing machines (1996). In her view, these kinds of products are based on a social and economic assumption that women's household labour is free (Graves, 1996).
Recommendations	**K: Project (object)**
	Create products for female users and base these designs on a thoughtful and respectful reflection on gender and user needs • This argument is seen in a range of texts. Though, this is particularly pronounced in Hansson and Jahnke's writing (2009). They argue that designers should work to

	understand user's needs and possibly involve users in the design process (Hansson & Jahnke, 2009). Pay attention to and support individual users, focusing on their personal needs at many levels • Most of the co-design projects focused on empowering the individual user, with the view that these empowered individuals could eventually effect larger change. Produce feminist technology, which conforms to and helps further feminist politics • This argument is seen throughout the *Feminist Technology* anthology (Layne, Vostral & Boyer, 2010). Create complex objects that operate at many levels and hold a range of meanings including a support for pleasure, fun and happiness • In one of the co-design projects, the participants saw the problem and need at a physical and emotional level and addressed it through the product's physical characteristics, symbolism and aesthetic including its feeling and look. Create user-driven and open-ended design objects • This was the subtext of several co-design projects, which is likely related to a feminist emphasis on self-determination and freedom. Create grass-roots and community-oriented design objects that can be implemented by the local community, draw on their existing strengths and expertise and support the local community and respond to their specific needs • Two of the co-design groups engaged at this level. It offers a new context for design activities and the implementation of design objects that breaks down power dynamics in industrial design and can help design and design objects better support society and their users.
Critiques	**F: Other projects**
	These systemic issues and broader feminist concerns are present in the range of other projects like marketing • For example, Perkins (1999) was concerned about a potential shortage of female decision-makers in these roles, which could negatively effect design decisions and the way the product is presented to the public. Unfair labour in projects like manufacturing or sales • This critique was especially pronounced in two co-design projects.
Recommendations	**L: Other projects**
	Feminism in industrial design doesn't address issues in other projects like marketing, leaving an opening for initiatives in other fields • This is an observation drawn from the literature. Many texts stress the prevalence of issues in these related fields, but few suggest changes or appear to view them as an industrial design responsibility. Support best practices in labour • The co-design projects demonstrated that feminism engages with labour in the project of production. The feminist perspective in each co-design project was attentive to the people involved in producing the design object. Create good jobs through the production and execution of the design solution • This was the point of focus of two co-design groups. Acknowledge and embrace women's agency and power where users can interpret and employ design objects in their own ways • As an example, Vostral and McDonagh challenged the vision of women as passive consumers and suggested thinking of users as smart and engaged, possibly with insights to offer to design (2010). Support user-driven design and design processes like 3D printing • For example, Rawsthorn explained that new technologies like 3D printing empower users, allowing them to become designers and create products appropriate to them and, notably, to their gender identity (2014).

6 Discussion

These critiques and recommendations are valuable to industrial design and offer a range of potential contributions. At a broad and general level, they introduce an alternative perspective to industrial design, which can help the field move forward and adapt to changing realities and imperatives. The specific critiques and recommendations can be broadly applied. They can pinpoint problems within the field that ought to be avoided and can guide alternative practices. These changes would help industrial design align with feminism and its social goals and would enhance social responsibility in the field.

The critiques and recommendations could also inform sub-fields and specialty areas within industrial design like design for sustainability, co-design, and critical design. Certain critiques and recommendations could contribute to and even enhance their respective theory and practices. As an example, several recommendations inform the group dynamic in co-design projects. Given feminism's points of emphasis, these recommendations could be applied to encourage a relatively equal and, likely, empowering dynamic.

This illustration of the value and contributions of a feminist perspective in industrial design could also propel future changes inside and outside the field. Beyond informing various tips and tricks for industrial design, they could encourage the application of a feminist lens in design research and practice that could inherently offer these same contributions.

Finally, these critiques and recommendations could also offer broader social value by contributing to the feminist cause. Changes within industrial design would complement the feminist work already being done in the public sphere and in many other professional fields.

Though, these results must be understood as generalizations across different feminist perspectives. They are also anchored in the research context and my treatment of feminism and industrial design. Future projects from different contexts or with a more targeted focus toward feminism or industrial design could provide different results.

7 Conclusion

This research paper drew on a literature analysis of the existing feminist work in industrial design and project-grounded research based on co-design projects with feminist participants to identify a list of feminism's critiques and proposals toward industrial design. These outcomes offer a range of potential contributions to industrial design theory and practice and, more broadly, social justice and the feminist cause. Hopefully this paper will be helpful to the feminist design community through its meta-analysis and by providing a tentative map of feminism's intersections and interplay with industrial design. However, I also hope that it will speak-to the broader design research and practice community and that they will consider applying some feminist suggestions to industrial design in their work.

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Bookmaking as Critical and Feminist Practice of Design

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Expansion of the arts in academia has called into question concepts, norms and regulations concerning writing and publishing. Given precedents of 'critical practices of design' and 'research through practice' grappling with such questions, I take these as ways to reconsider the academic activity of making a book ('bookmaking') as a critical and feminist practice of design. Through feminist modalities articulated by Jane Rendell – namely, collectivity, interiority, alterity, materiality, and performativity – I describe two edited books, through which I am able to discuss critical and feminist orientations in bookmaking practice. I argue that feminist practice critiques but also projects, activates, and enacts alternative norms or ideals – here, alternatives to academic norms concerning edited books. Naming and elucidating detailed aspects of bookmaking activity, as mundane critical 'practise' continually deliberated and performed, it is nevertheless possible to draw relations to larger theoretical issues. For example, discussing across differently situated/conditioned bookmaking practices makes it possible to trace implications of bookmaking within larger political economies, socio-economic structures, theoretical and ideological commitments.

critical practices of design, feminist theory research through practice, book and bookmaking, editing

1 Introduction

The expansion of the arts in higher education, research and academia has surfaced vivid discussions for many decades, for example concerning the role of arts practices in theory-building and knowledge-making. Relations, interactions and interdependencies of theory and practice have been central to both discussions of 'critical practices of design' and 'research through practice' (Mazé & Redström, 2009). New and hybrid conceptions have emerged particularly via socio-technical and feminist studies, for example through concepts explored by Donna Haraway (1988, "situated knowledges"; 2011, cats' cradles and "string figures are thinking as well as making practices, pedagogical practices and cosmological performances") and contemporary crossovers into design such as Janet Jeffries (2012, "mangling practices"), Kristina Lindström and Åsa Ståhl (2014, "patchworking ways of knowing") and Laura Forlano (2017, "data rituals"). Actively engaging with

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such concepts such as knowledge, knowing, thinking and data, the arts have also interrogated the institutionalized forms that practices of theorization takes, including norms and regulations of documenting, writing, evaluating and publishing practices. As architectural theorist and feminist scholar Jane Rendell articulates:

> *The rise in what has been termed practice-led/-based research... has produced an understanding of practice as a process which occurs not only through the design of building but also through the activities of using, occupying and experiencing them, and through the mode of writing and imaging used to describe, analyse and interrogate them.* (Rendell, 2011, p. 23)

The doctoral dissertation has been a site for such critique in design. It was in my own dissertation that I encountered, questioned and reconfigured structural, material and graphical qualities of the book itself to better reflect particular qualities of knowledge-making advanced within (Mazé, 2007). This and other creative and critical interrogation of the dissertation form by teachers, colleagues, peers and students, have, in turn, been the subject of studies by others (Seago & Dunne, 1999; Yee, 2010; Krogh et al, 2015). Further and dramatic examples are found within dissertations in more established academic disciplines such as architecture (c.f. Grillner, 2000; Bonnevier, 2007; Burroughs, 2016) that, informed by feminist writing practices (Livholts, 2011), articulate and explore alternative subject/author positions, identities and voices, playing with and blurring theory/practice and high/low literary forms and boundaries.

While a dissertation is typically an individual and mono-disciplinary work (with notable exceptions f.ex. Lindström & Ståhl, 2014), edited books and anthologies entail further interrogation of these issues as they include contributions of multiple authors and potentially multiple disciplines, in which multiplying norms and regulations are even more challenging and, potentially, a critique even more radical. Given precedents in the form of dissertations as well as of other forms of practice by those self-identified in design as 'critical' and/or 'feminist', I argue here that making a book can be understood as a critical and feminist practice of design. This is introduced by sketching some preoccupations of critical design/architecture with the material object but, also, beyond the object, and I argue that expanded forms of critical practices include activities such as lecturing and administering as well as writing, reviewing, editing, i.e., 'bookmaking'.

Bookmaking is a term associated with gambling, its speculative and sometimes shady methods of 'adjusting the odds'. I use the term here as feminist wordplay (Livholts, 2011; Haraway, 2011) and in reference to the risks that such practices can and must take to "trouble" (Stengers & Despret, 2014) norms. Similarly, architect and theorist Stan Allen elaborates his use of the term 'speculative':

> *It is important to clarify what I mean here by 'theoretical' or 'experimental' work. I don't mean maintaining a safe, academic distance from the messy complexity complexities of practice, program, politics and reality. (I prefer the term speculative not only for its etymological connection with seeing but also for its slightly sleazy real estate connotation).* (Allen, 1993, p. 100)

I focus on specifically feminist approaches to critical practice through Rendell (2011), elaborating upon two edited books through which I am able to discuss critical dimensions and feminist positions in the detailed everyday activities of bookmaking.

1.1 Research through (bookmaking) practice

Acknowledging and taking advantage of my own particular and situated knowledge on the topic, I consider this paper in the vein of 'research through practice'. In this vein, my work reported here can be understood as a kind of 'practice-led' research, in which my reflections and conceptualizations have accumulated gradually on the bases of multiple experience of bookmaking. Specifically, I have been an author, reviewer and editor in the two books described: *Share This Book* (Mazé, Plöjel, Olausson, Redström & Zetterlund, 2013) and *Feminist Futures of Spatial Practice* (Schalk,

Kristiansson & Mazé, 2017). Thus, cumulatively and retrospectively theorized, my argument here can be understood as reflection 'on' and 'after' rather than 'in' practice (Blythe & van Schaik, 2013). Through doing book projects and encountering other personal, disciplinary and institutional standpoints, my own reflexivity has sharpened as a sort of moving between 'inside' and 'outside' perspectives on the practice (Mazé, 2009). The occasion of the latest book, *Feminist Futures*, has occasioned a more explicit, externalized and systematic reflection on editing and producing the book as a critical practice, and is also therefore more extensively elaborated here.

2 Critical and Feminist Practices of Design

By 'critical practices of design', I refer to various critical movements within architecture, design, and the applied arts (Mazé, 2007; Mazé & Redström, 2009). Materiality has been the predominant intersecting issue for critical practices of design and of architecture. Each has explored the form of critique – the spatial and material form in which critical practice manifests. Early critical architecture was preoccupied by form and the semiotics and transmission of theories and ideologies through form (Mazé, 2007), which are in some ways echo in Dunne's articulation of 'objects as discourse' (Dunne, 1989). In Dunne's doctoral dissertation that included both written and design components:

> *The electronic objects produced in the studio section of his doctorate are still 'design,' but in the sense of a 'material thesis' in which the object itself becomes a physical critique... research is interpreted as 'conceptual modelling' involving a critique of existing approaches to production/consumption communicated through highly considered artifacts.* (Seago & Dunne, 1999 p. 12)

Preoccupation with materiality, objects and artifacts has provoked varied responses, and myself and others have instead articulated roles of critical object in consumption practices (Mazé, 2013), in discursive processes with industry (Tharp & Tharp, 2013), in the formation of publics (Kerridge, 2015), and in social media (Morrison et al., 2011). As critical practices and 'research through practice' have thus expanded 'beyond the object' in and of itself, its increasingly necessary to engage with social and critical social theories to deepen design research (Mazé & Redström, 2009).

2.1 Critical practices of design 'beyond the object'

In critical graphic design discourses, the structures and activities circumscribing artifacts are highlighted and not only the graphical form. An example is Dexter Sinister, which started as a self-reflexive response in the wake of 9/11 by David Reinfurt and Stuart Bailey (Reinfurt, 2009). Their work can be discussed in formal terms – they do produce books. But their practice also takes the form of the 'Just-In-Time Workshop & Occasional Bookstore', a space and time for anyone to learn and self-produce graphic design and with a lending-library and community-building intent. This alternative production and distribution model is a critique of material economic and even social unsustainability of their discipline – "best described as a self-conscious model: both a regular design studio *and* a tool to question the nature of a design studio" (Dexter Sinister, 2009, p. 267). Similarly emphasizing the 'practice' rather than the object in and of itself, James Goggin's firm is named Practise, in which the British spelling with an 's' exclusively denotes a verb (whereas 'practice' can be a noun or a verb). Goggin positions his work in relation to both critical and 'relational' (as in "relational aesthetics") in design to expand a notion of criticality as inherent and intentional within everyday work and social activities:

> *My own graphic design practice is largely organizational, in both performative and pragmatic senses: lecturing, workshops, curating, but also editing, production, distribution. Graphic designers often complain that, realistically, in a professional practice one spends only a small fraction of time actually 'designing', the rest being taken up with so-called 'admin' (that is, organizing): phone calls, reading, meeting clients, press-passing, making mock-ups, etc.* (Practise & Europa, 2009, pp. 43-45)

> *The experienced graphic designer – whether working only by commission, or with a mix of commissioned and self-initiated projects – becomes naturally skilled in all of these areas, so it becomes logical to apply this knowledge both to the service of a client and as a means of self-production, analysing all channels of interpretation, production and distribution for potential creative and critical scope.* (Goggin, 2011, p. 33)

Practice or 'practise' could thus be understood as a further intersection between genres of critical design and architecture "beyond the object" (Mazé, 2007). Such a commitment is shared in contemporary conceptions of "critical spatial practice" articulated by Jane Rendell. She emphasizes 'practice' given both the silos within the architectural academy and contemporary societal issues. In the vein of critical social and feminist theories, she articulates theory and practice as inevitably conditioned by and therefore taking a position in relation to larger societal structures and injustices. This requires understanding, but also action and resistance, and it is practice and everyday activities that foregrounds both creativity as well as critique (Rendell, 2011).
Rendell's articulation of critical spatial practice is an analysis of architecture, including the material, social and organizational practices of architects, firms and collectives. Further, she extends the notion to her own everyday practices, including those of lecturing, writing and editing. For her, these are critical *and* spatial practices – since creative and critical knowledge-making within these cannot be separated from processes and experiences of architecture (Rendell, 2005, 2007a, 2007b).

2.2 Critical feminist practices

In terms of this additional discursive intersection between accounts of critical practices of design and architecture, everyday embodied, social and spatial aspects come into focus. Critical graphic designers perceive their practice (as noun and verb) as critical, not only the objects produced therein. The way something is produced and distributed, the researching of a brief, the writing of a contract or budget, the social interactions, the writing and editing of a book – these can also be treated as critical design/spatial practices. This opens new areas of inquiry, such as how a critique is performed by subjects (by and for whom) within particular activities (how, i.e. modes of operation and organization).

Rendell sharpens articulations in relation to questions such as who and how. Through a feminist lens, she analyses critical spatial practices in more particular terms, in terms of "the subject matters that resonate with feminists as well as modes of operation that feature strongly in a predominantly feminist mode of critical spatial practice" (Rendell, 2011, p. 24). These modes of operation are material and spatial but also characterized by forms of social relation, order and structure, as well as relation to oneself, subjectivity, identity and voice. Rendell names feminist modes including: collectivity, interiority, alterity, materiality, and performativity.

- *Collectivity* in Rendell's account represents not only a particular organizational form of practice (she points to several feminist architectural collectives including FATALE, in which my *Feminist Futures* co-editor Meike Schalk was an initiator) but also a focus and direction of practice. "In architecture, to position a building as a 'methodology', rather than as the end result of the method or process that makes the building is a radical proposition" (Rendell, 2011, p. 26). She thus makes a connection between critical spatial practice and relational aesthetics and practices in the arts, via feminist philosophical and ideological commitments.
- She traces *interiority* to a shift brought about by philosophies of deconstruction that refute binary and hierarchical conceptions of 'either/or' and, instead, elaborate on 'both/and'. Instead of 'public' or 'private', 'external' or 'internal', 'male' or 'female', spectrums, hybrids and alternatives in spatial, embodied and socio-political terms can be explored and valorized. In feminist approaches this can manifest as exploration of the connectedness and interdependency of psychic and societal conditions, domestic and political economies, cultural and ecological systems.

- *Alterity* relates to discussions of location over several decades, for example in feminist discussions of 'situated knowledge and 'standpoint theory' to examine inter-relation between location, identity and knowledge not only in a geographic but an epistemological sense. Tracing relations to post-colonial theory, Rendell discusses examples that, from alternative or sub-altern positions redefine hegemonic practices such as historiography. Potentially vulnerable practitioners may take on guises, such as Shia women writers under a Taliban regime meeting as sewing circles.
- As *performative*, she articulates the exploration of one's relation to another, for example relations between differently-situated knowledges. She is interested in the movement itself, moving outside of and coming back to one's own discipline in another way. In feminist writing traditions she discusses how moving between authorial voices and literary genres inquire into writers' relations to their own work and challenge the possibility of any singular and static point of view. Besides voice and genre, she notes the spatial and material qualities of a text, "the critical, interdisciplinary and performative qualities of writing, as a form of materialized philosophy" (Rendell, 2011, p. 37).

In this section, I have expanded the terms of critical practices of design in this section and thereafter honed in upon some more particularly feminist critical lenses. Next, I will reflect upon this in action by accounting for my own everyday activities as critical and feminist, specifically activities within my practice as a design researcher including lecturing, writing, reviewing and editing, etc. More specifically, in order to understand the 'how' and 'who' as well as the material/spatial aspects of these, I will use Rendell's modes to discuss these as critical feminist practices of design.

3 Bookmaking as critical (feminist) practices of design

Rendell argues that the edited book is an ideal site for investigating critical and spatial movements between disciplines, in her case between spatial and historical knowledge, theory and history (Rendell, 2007). This idea was enacted physically and socially in the 2009 FATALE Salon 'Anthology Works', in which Rendell was a keynote. Participants including myself took part in a series of activities exploring the notion of 'anthology' from different disciplinary positions. An example was Katja Grillner's activity 'Architecture Writing Workshop', previously enacted with Mona Livholts and others (Grillner, 2013), that unfolded as role-play and dialog among participants through the medium of extracted quotations from a historical canon of feminist texts.

Not only the content of the texts but the format of the activity itself was positioned as feminist – as practicing the conventional academic anthology "otherhow" or "otherwise" (Petrescu, 2007). The anthology as a structure for selecting, giving voice to and citing particular texts and authors, can become feminist or decolonial when done by or with others, and otherwise. Anthologizing and other academic practices have normativities and exclusions – another such academically institutionalized practice is citation, prompting Sara Ahmed's call for 'critical citational practices':

> *The reproduction of a discipline can be the reproduction of these techniques of selection, ways of making certain bodies and thematics core to the discipline, and others not even part.* (Ahmed, 2012)

In Anthology Works, as any anthology, texts were selected and sequenced, but here *collectively* and *performatively*, in an embodied and dialogic way creating relations or *interiority* among differently-situated knowledges, and in which sub-*altern* authors outside of the mainstream canon were voiced and heard by each and all together. Anthology Works is a microcosm of two examples of books, or bookmaking practices, that I elaborate below. In the words of Dexter Sinister, these are both academic edited books *and* tools to question the nature of an academic edited book. In other terms:

> *Feminist futures are becoming when common projects – e.g. a course, a conference, an exhibition, a carnival, a series of 'rehearsals', etc. – not only momentarily produce an alternative space, but effect new connections and social relations that can alter*

ingrained patriarchal structures as many of us still experience them, i.e. in hierarchical and competitive educational systems and disciplinary structures (see Stengers and Despret, 2014; and Ahmed, 2012). (Schalk, Mazé, Kristiansson & Fanni, 2017)

3.1 Bookmaking: Share this Book

Share this Book (Mazé et al, 2013) is a co-authored and co-edited book produced during a design research project setup to articulate critical perspectives on contemporary sustainable design from three perspectives, from that of design theory (through the perspective of Johan Redström), history (through that of Christina Zetterlund) and a practitioner (in this case, my own accounts of 'research through practice'). The book included sections authored by each, an introduction that included a jointly-authored part (expressed as "we") and individually-authored parts (indicated by names), and a concluding transcript of a dialog among the three and the book designer Matilda Plöjel. Instead of producing an exhibition or prototype, as might be typical in critical design or 'research through design', the book was setup as a kind of exhibit. Each authored section also included pages given over a previously or newly created collaborative work external to the project. Importantly, this was not positioned as illustration but as performance of the argument through other means, whether photography, curation or cultural production.

The book designer was present (and paid) from the start as member of the book team, and she designed a unique typeface as well as analysed, proposed and made choices regarding printing, paper, binding, protective cover, etc., all from a staunch sustainability perspective (Borggren et al., 2011). Beyond the ecological footprint of the printed book, she considered distribution and circulation, which led to a fourth 'exhibit' in the book with an external collaborator, a visual-typographic essay about sharing, reusing, recycling, etc., the book – hence the title S*hare This Book* – and its cover as start of the exhibit. Her investigation drove priorities within negotiations with publishers, and we left several publishing options due to their unsustainable production and distribution typical in the industry. The book was unconventionally printed, bound and distributed, including a second edition (with own ISBN) in digital form. These choices were elaborated in an 'extended colophon' that had the import of a chapter in size and in the Table of Contents.

The example of this book deconstructs everyday activities in the practice of 'bookmaking' that can be seen, and in this case, were intended, to have a 'critical scope' (to borrow the words of Goggin). As a basis for discussion across two books in the last section of this paper, three relevant aspects (among others) of activities and decisions with critical import include:

- Selection, positioning, sequencing and voices of individual contributors
- Treatment and relation of theoretical and practical work (both labor and content ie. 'exhibits')
- Terms, materiality and ownership within industrial production and distribution

3.2 Bookmaking: Feminist Futures of Spatial Practice

This book was the culmination of a process set into motion in 2011. At that time, a course themed 'Feminist Futures' was organized as part of the 'Introduction to Architecture and Gender' module offered since 2008 by the Critical Studies unit of Royal Institute of Technology (KTH) School of Architecture in Stockholm, Sweden. In 2011, the course was a collaboration with the organizations Women in Swedish Performing Arts (WISP) and The New Beauty Council. Organized as a series of lectures and workshops for students and the public, the course became a platform for interaction among a local network and international contributors from architecture, the arts and other fields. The course was a stage for testing various feminist scenarios and subject positions, which prompted the initiation of a process developing the book to articulate different and common perspectives. The process of producing as well as the production of the book can be understood as a feminist critical practice (or "pedagogical queering-tool" (Schalk et al, 2017) in many ways. One aspect is the setup of the course itself. Meike Schalk from FATALE and KTH and Thérèse Kristiansson from The New Beauty Council organized the course in particular ways that defined a creative as well as

resistant relation to the normal procedures, regulations and expectations of an academic course. It had an open admissions policy regarding academic level and university registration status of potential participants, and it was also open to the public. The venue was off-campus at WISP. These and other careful micro-decisions were debated from feminist and queer standpoints throughout the activity of planning and organizing the course. These produced a course with a very diverse range of participants (from 20- to 70-year olds), scholars as well as practitioners spanning an unusually wide range of disciplines.

Many further aspects of the course as feminist critical practice could be discussed. This ranges from the selection and handling of contributors and contributions, the selection and involvement of the book's graphic designer, the making and use of typeface ("Lipstick" by graphic designer Kerstin Hanson), the negotiation of copyright and publisher's logotype placement, etc. Here, and in the 'research through practice' tradition of acknowledging my own particular 'situated knowledge', I will account for three aspects that I experienced directly that raise relevant issues regarding the book as (feminist) critical design practice.

3.2.1 Lecturing and authoring in dialog

> *The series consisted of ten sessions, one afternoon per week, each with a lecture and workshop… The workshops were an important pedagogical foundation, enabling experiential and embodied engagement with the lecture content. Workshops included various making activities, for example, collages, drawings, models, doing crafts, explicitly full-bodied as well as reflective activities, such as writing individually and together, and performances of various kinds. During the course, these experiences of 'learning through doing', or practicing 'otherhow', became increasingly important… Through such activities, we found diverse ways of learning and expressing through our own experiences as well as for discussing and collaborating with others.*
> (Schalk, Mazé, Kristiansson & Fanni, 2017, p. 17)

Along the lines of Rendell's critical spatial practice, the course enacted particular learning and teaching experiences, in which multiple forms of knowledge-making were actively performed towards a particular (normative, feminist) end. As one of the invited contributors with colleague Josefin Wangel, we extended the dialogical principle as one between theory and practice within our respective fields of design and futures studies. Josefin and I prepared a lecture and guiding slides, in which we took turns, each outlining key issues and (feminist) alternatives, in theoretical terms, in terms of others' practices and with an example of our own practices. In the process of preparing and in delivering the lecture itself, we continually re-negotiated the selection, articulation and relevance of each of these aspects in relation to the other. This was the first public version of an informal dialog begun in the coffee break of the Stockholm Futures Conference where we were speaking individually. Within our session workshop, we formulated a scenario activity for participants to envision the future from an embodied and socio-material perspective, ie. their desired future societal structure and material culture. In this, further positions were articulated within the dialog.

We transformed our dialog in another form when the book development commenced and we were invited to contribute. Our writing process for the chapter evolved in the form of a dialog in three voices – in sections authored individually and co-authored as "we". These voices were interwoven as disciplinarily- and personally-grounded angles on three shared issues of concern. In this, we extended the dialogical principle from a teaching format to a learning format for ourselves and from the course participants (who formulated other angles through the workshop), to an experiment within a tradition of feminist writing practices. Such writers refuse the colonial "God trick" (a single point of view imposed as neutral and universal; Harding, 2011) by carefully articulating the subjectivity, situated-ness and contingency of standpoints by attending to issues of voice, identity and position within authorship.

3.2.2 Reviewing and editing in the round

> *Five 'roundtable' sessions were organized between May and August 2014 by Meike and Thérèse. Some roundtables took place at the Swedish Centre for Architecture and Design (Ark-Des), some at a local studio, and one at the Institute for Housing and Urban Research in Uppsala invited by Irene Molina. Contributors to the course in 2011 and previous years were asked to develop texts and projects for this book. Roundtables took the form of intimate conversations of texts circulated in advance, closely read and carefully commented by participants and a designated 'peer reviewer'.*
> (Schalk, Mazé, Kristiansson & Fanni, 2017 p. 18)

As contributing authors, Josefin and I were invited to a roundtable. This was a new concept – peer review 'in the round', in which contributors from different backgrounds, disciplines and different positions within the academic system or from outside met on equal grounds. Peer review is a key mechanism to ensure quality in the academic system in which many of us work. Instead of the standard 'blind' peer review, which serves gender and other measures of equality in publishing (not unequivocally), another approach was taken to 'quality' and 'equality' from feminist pedagogy, including "the pleasure of conversation" and "feminist collective reconstructions" (Petrescu, 2007). Each contributor had shared with all a chapter draft, which meant each was equally vulnerable and gave each a common stake in both receiving and giving feedback. Giving and receiving feedback in person, as a conversation and around a table entailed that critique became dialogic and mutualistic, articulated from distinctly different but mutually respectful positions. The external 'peer reviewer' in our session acted as kind of moderator, rather than as an evaluator, reading between the lines of the draft and listening for emerging issues in the conversation to highlight particular contributions and articulate common issues from the different perspectives.

Review had a pedagogical purpose as a kind of peer learning, in contrast to other purposes such as critique or evaluation. Unexpected commonalities and differences emerged within the peer review conversations, which thus constituted a kind of interpersonal or collective knowledge-making. After the roundtables, each draft further evolved through several cycles of further review with the three book editors. Reviewing continued as an increasingly precise form of dialog, in which each draft was discussed to articulate the main issues but then feedback was given in the form of two or three reviews unfolding each issue in different ways and from different perspectives. As editors also contributed with chapters, thus reviewed by the others, they were continually sensitive to the personal and power relations enacted within review processes. This reflection and transparency throughout the process attuned not only to articulating but listening carefully, more than in standard review or editorial processes. An implication is more careful and multifaceted editorial position, and the evolution of chapters that ever-more precisely in argument, language and form expressed the author(s) own position and voice.

3.2.3 Differentiating and commoning styles

> *Just as standard academic peer-review, editorial standards and style guides have their normativities and exclusions, we can recognize our own as we reproduce these or produce others. We have also learned by doing, through continual forms of dialogue, about our differences as well as our commonalities.*
> (Schalk, Mazé, Kristiansson & Fanni, 2017, p. 22)

Already within cycles of review and revision of chapters, style guides began to loom large as critical, as a matter of authorial expression, disciplinary specificity, and representation of sources. This was also, of course, an issue of budget, workload and editorial standards. As contributing authors spanned disciplines and countries, there were differences in choice of British or American English, in choice of style guiding grammar, spelling and punctuation, convention for citation and bibliography, handling of imagery, permissions and captions. It is typically an editorial task to set and enforce a single standard and style throughout, which in turn is usually dictated by the choice of publisher.

During the review process, and negotiations with publishers were still ongoing, editors made the choice not to make the decision based on anticipation or solicitation of a particular publisher. Instead, they encountered and discussed the issue within the context of each chapter, including diverse styles of argumentation and writing reflecting different positions, backgrounds and disciplinary conventions. Further, as many chapters experimented with feminist writing traditions or took unconventional forms such as dialog, interview, and visual essay, in which the choice of style was also a matter of self-expression and knowledge-making processes.

The first decision, then, was that author(s) of each contributing chapter should select their own style guide. This entailed that they had the main knowledge and responsibility concerning the style guide, as neither we editors nor copyeditors could know the full range of styles used across the chapters. This decision based on principle had consequences in additional revision cycles for author(s) to handle this themselves, extended timelines for copyediting, graphic design and, eventually, printing. For them, the variation of style is a direct expression of the interdisciplinarity of the book contents. A second decision was made concerning the bibliography based on commonality – rather than individual or disciplinary specificity. Unconventionally, the chapters do not end with a bibliography but, rather, all references are collected in a single style-guide standard at the end of the book and spanning 14 small-font, double-column pages. This decision entailed six extra work days by the editors. The consolidated references, however, end the book with a common form and, more importantly discovered in the process, reveal not only the breadth of references but also repeated and thus core sources shared across many authors, chapters and disciplines.

4 Discussion and conclusion

If Anthology Works elucidates bookmaking an anthology "otherhow" and "otherwise" (Petrescu, 2007), *Share This Book* and *Feminist Futures of Design Practice* further elaborate critical dimensions and feminist positions in the detailed everyday activities of bookmaking. Regarding *Share This Book*, I laid out above some aspects of such activities within bookmaking practice:

- Selection, positioning, sequencing and voices of individual contributors
- Treatment and relation of theoretical and practical work (both labor and content, i.e. 'exhibits')
- Terms, materiality and ownership within industrial production and distribution

Further, regarding *Feminist Futures*, and given the feminist subject matter of, such aspects of bookmaking practice are particularly relevant to query in terms of Rendell's modes *collectivity, interiority, alterity, materiality,* and *performativity*. While critical practices may generally examine how a particular social-spatial order is constructed, and critical spatial practice may work to destabilize that order, feminist practice is normative (Mazé, 2013). Feminist practice questions and opposes a given dominant/oppressive norm – it also projects, activates, and enacts alternative norms or ideals (Schalk, Mazé, Kristiansson & Fanni, 2017). Feminist practices of design query not only the *what* (objects) and *how* (practice or 'practise') but the *who*, i.e. the subjectivities, positionalities and locations (that are often tacit or oppressed, see Prado, 2014).

In bookmaking *Feminist Futures*, *collectivity* was engaged in a variety of ways. In lecturing, authoring, and reviewing, personal and professional standpoints were carefully and continually re-positioned. In *Share This Book*, the different disciplinary standpoints were held apart – there were few sections written as "we", and the different textual and 'exhibit' components were carefully authored particularly to explore 'inside' and 'outside' perspectives on one's own and other's contributions (Mazé, 2009). In *Feminist Futures*, regarding style guides and citations, there was a similar clear demarcation of difference (each chapter with own style) and common canon (in the form of all references collected alphabetically at the end, with all names spelled out to also celebrate the too-often sub-*altern* gender/culture representation in citations).

In the *Feminist Futures* chapter, voices were woven more intimately together in close dialog, a kind of *interiority* as mutual vulnerability through which identity, family and community dimensions as well as disciplinary perspectives could be unfolded. Similarly, in the roundtables, participants from distant social/cultural locations were present as a kind of alterity with a danger of inequality or hierarchy (or the sub-altern). However, the *performative* experience of face-to-face conversation, the vulnerability and responsibility of reviews to/from all, and the diplomatic moderation of the peer reviewer. There was never a 'universal' nor neutral position but, rather a safe space created spatially (in the classroom, around the table, and, consequently continued in more distant and written exchanges during editorial review). Indeed, the documentation is quite careful even about the mention of "making tea" that evokes Meike's feminine ethics of care.

In terms of treatment and relation of theoretical and practical work, each book had different approaches. In *Share This Book* and, to a lesser extent in *Feminist Futures*, contents, labor and time participants was carefully managed, including resource allocation for non-salaried participants. Perhaps *Share This Book* operated more of an 'or' than an 'and' logic, in which *interiority* in the form of participating researchers can be contrasted to others in the process, each operating perhaps more individually than *collectively*. Textual and 'exhibit' components were held apart through the distribution of parts within and across chapters, and through carefully differentiated voices and disciplinary standpoints. Nevertheless, the clear-cut terms also made it clear when boundaries were crossed, for example with the growing engagement of the graphic designer beyond the material to a clearly critical practice orientation along the way. In this way, potentially different treatment of participants or *alterity* of the designer or of practice as secondary or sub-altern in relation to theory shifted in a positive way over time, eventually manifesting in contributions with the designer's eventual status of a chapter and 'exhibit' in the Table of Contents.

In some ways, the handling of labor in *Share This Book* avoided the sometimes hidden inequalities of feminist *collectivity* (c.f. Berglund, 2007). At the same time, in *Feminist Futures*, with the particular attention to individual contributors, different voices, standpoints and styles, the labor in reviewing and editing could not be easily (nor desirably) anticipated. The issue of styles and common citations was arrived at *performatively* (and a bit painfully) through discussion of alternative (and feminist) approaches, and the principle was more important than labor/budget logics. Indeed *Feminist Futures* can perhaps elucidate the difficult dynamics of feminist economies (Gibson-Graham, 2008). It demonstrates a valuation and reliance on relationships and resources within a collectivity that evade the rationalities (and, perhaps in some cases, efficiencies and equalities at least in measurable terms) of market economic logics. Within bookmaking, there was no clear-cut either/or, but a continual *interiority* of re-negotiation among those with different conditions and concerns.

Regarding terms and ownership within industrial production and distribution, the two books are also distinctly different. Principle guided decisions *performatively* in *Share This Book* as incremental and continuous decisions concerning selection of publisher, printing materials, production and distribution methods. Certain norms (ie. sustainable) were held over others perhaps more conventionally held (ie. profit through mass-production/distribution, etc.) selection of publisher, printing inks and papers, production and distribution methods. In this sense, a quality of *interiority*, or internal logics, was also manifest across different procedures and externally. In *Feminist Futures*, the intense *collectivity* (of continual 'being-in-relation') and interiority (both/and, always) continuously *performed*, entailed more difficulties in drawing boundaries and endings. Principled and internally-shared commitments were sometimes difficult to reconcile with other structures and conditions such as the publisher's conventions and regulations. In retrospect, it is interesting to consider the copyright terms of each – *Share This Book* is Creative Commons while or difficulty to define individual as well as share terms in *Feminist Futures* has recently ended in a domineering and dead-end reprint negotiation on behalf of the publisher with a global partner.

4.1 Conclusion

I do not propose here a potentially generalizable framework nor universal prescriptions – rather, and in the vein of 'research through practice', I would articulate my conclusions as a kind of delimited regime of situated and provisional knowledge (Brandt et al., 2011). Firstly, articulating critical design/architecture beyond the object, I have elaborated further intersections between – specifically, practice – and have extended and applied particularly feminist modes of bookmaking as a critical practice of design. Through the two examples, it becomes possible to distinguish normal and multiple other ways of doing bookmaking – indeed, this also helps to understand that notions such as collectivity can be understood, organized and experienced in many ways. Naming and elucidating detailed aspects of bookmaking activity, as mundane critical 'practise' continually deliberated and performed, it is nevertheless possible to draw relations to larger theoretical issues, for example in relation to Rendell's feminist modes that allow for clarification and differentiation across differently situated/conditioned bookmaking practices and larger socio-economic concepts and structures. As situated and provisional, this backdrop, bookmaking activities and feminist modes constitute a set of tools that I will further explore in my own work, and that may be interrogated by other critical/feminist practitioners on their own terms.

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Taking Care of Issues of Concern: feminist possibilities and the curation of Speculative and Critical Design

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What are the possibilities for taking a feminist approach on 'an ethos of care' to the settings of engagement with Speculative and Critical Design? In this paper, I explore the intersection between the curation of Speculative and Critical Design (SCD) and the notion of 'care' as a question that has arisen in the work of feminist scholarship in technoscience. Feminist voices in SCD and related design disciplines have drawn attention to 'neglected things' within certain works of Speculative Design research. I expand this consideration to the settings of encounter with SCD. Through a short case study of curatorial practice, I focus through literature, in particular from Maria Puig de la Bellacasa, to speculate on how qualities of care raised through enquiries in feminist technoscience are useful to consider in the care or curation of speculative enquiries around issues of concern.

care; feminisms; technoscience; speculative design

1 Introduction

In this paper, I explore the intersection between the practice of curation and the settings in which it engages with Speculative and Critical Design (SCD). In so doing, I take up the notion of 'care' in the work of feminist scholarship in technoscience, notably Maria Puig de la Bellacasa's "matters of care" (2011; 2017), in order to explore how curatorial practices themselves might open up speculative possibilities. If feminist design researchers take seriously the view that museums and galleries may be unsuitable sites for the display of SCD (Russell, 2015) then what possibilities does this raise for the settings of engagement with SCD and for the practice of speculative curation? That is to say, if the organisational settings of cultural institutions, including museums and galleries, operate to enact and reproduce dominant and normative traditions of representation and meaning making, then we – as feminist design researchers – should, in part as a consequence, be sceptical about claims as to the efficacy of the production of debate in 'design for debate' (Kerridge, 2015).

As a mode of design practice rooted in the notion and exercise of care, curation raises the question and possibility of how to care for speculation. In responding to this question, this paper draws upon

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a rich and varied trajectory of work by feminist scholarship in technoscience. In particular, I focus on matters of care in order to develop a reflexive account of a specific case study of my curatorial practice. Puig de la Bellacasa encourages 'an ethos of care' in the study of science and technology – for which, she proposes a 'thickening' of Bruno Latour's 'matters of concern' with 'care' using feminist knowledge politics (2011).

The case study I describe, *Antarctica SE3,* was a one-off curated event[1]; and was conceived as a testing ground for a speculative engagement to care for a matter of concern of climate change. This case study can be seen as a pivot for this paper, and I motivate it in the following ways: I use it to summon writing on care from feminist technoscience – and I take-up this literature on developing 'an ethos of care' that I consider to be a sensitizing concept for reflection on the curation of speculative endeavours. I reflect on the requirements that an ethos of care places on curatorial practices of speculative works, including a sensitivity and attitude towards creating practice responses that are situated, self-reflexive and embodied. The case study of *Antarctica SE3* provides a description of a practice that attempted 'curating with care' and I use it to highlight these sensitivities. Then, through discussion, I also draw attention to further challenges for fostering an ethico-political commitment that is central to care, and for 'taking care of the possible'.

Initially, the paper proceeds by outlining the take-up of feminist scholarship by design researchers and practitioners. I then go on to describe the dominant settings of public engagement with the outcomes of SCD – e.g. exhibitions within cultural institutions – and a number of calls and critiques that ask us to pay attention to the mediation of design in these settings.

2 Feminisms, Speculative and Critical Design and the settings of engagement

Recently, there has been a clear interest and uptake of feminist scholarship from science and technology in the field of Speculative and Critical Design.

That feminist theories offer a valuable and urgent approach can be traced through lineages of the discipline of design through HCI and Interaction Design to SCD. This includes Bardzell's proposed integration of feminist approaches into interaction design research and practice (2010); that, in turn, brought forward traditions associated with feminism from HCI research, including Bell and Dourish's critique of ubiquitous computing that identified how certain technologies replicate visions of gender relations in the home (2006); to more recent work which employs an intersectional feminist approach to critique SCD and highlights the role speculative design artefacts play in reproducing normative futures; to suggest ways for opening up futures to a plurality of different voices (Prado, 2015; Mazé and Wangel, 2017, p. 273). Questions of the neglect of issues of gender, race and class have arisen as an acute concern for feminist design scholars and practitioners involved in understanding the role of speculative and critical design as design research (e.g. Prado, 2014). Furthermore, a recent 'Conversation' at the Design Research Society conference by Laura Forlano et al., took voices from feminist technoscience, including Isabelle Stengers and Donna Haraway, into the setting of design research; and asked, "How can engagement with speculative prototypes suggest a more participatory and co-designed experience?" (2016).

Extending from a focus on the outcomes SCD, to the settings of engagement with these outcomes, it can be seen that a dominant context for encountering SCD has been through the curated exhibition. Exhibitions, for the purposes of SCD, are conceived as spaces for public debate on issues of concern; and arguably therefore, the curation of such practice impacts this public debate. However, Kerridge suggests that we need more empirical accounts of "what exhibitions do for SCD" (2015). Gillian Russell provides such an account, as does Christina Coghill. Russell, in her review of *United Micro Kingdoms: A Design Fiction* by Dunne and Raby (Design Museum London, 2015) describes how the

[1] I am using the commonplace notion of event in this paper, and not 'event' as the technical philosophical concept used in the work on 'design events' (Jönsson, 2014) and 'prototyping as event' (Wilkie, 2013).

adoption of normative museological tropes of curation produced a didactic experience for an exhibition audience, impacting an opportunity for a more 'participatory speculation'. Russell suggests that museums and exhibitions may not be suitable places for works of SCD (2015). Then, Christina Cogdell in her review of *Design and the Elastic Mind* (MoMA New York, 2008) was critical of an overarching curatorial narrative. She draws our attention to the curatorial framing of the group exhibition, where a dominant viewpoint – of design and science aligned with progress, and of a human control over nature – served to perpetuate narratives of colonialism and the decimation of natural resources through deterministic stances around technological progress (2009).

Thus, when Prado (2015) suggests that a feminist perspective of SCD can also offer alternatives to "how these objects are presented", this also speaks to certain feminist curatorial practices that challenge and problematise the patriarchal structure and hierarchies of cultural institutions; or that highlight arrangements that contribute to reproducing established power relations, and neglect issues of gender, race and class (e.g. Horne et al., 2016; Molesworth, 2010; Ramos, 2016). As feminist voices from technoscience would remind us here – "ways of representing things has world-making effects" (Puig de la Bellacasa, 2017, p. 30) and that we need to find ways to 'care for neglected things' (Puig de la Bellacasa, 2011).

Whilst critique of exhibitions of SCD is important, there is perhaps a reduction of curatorial practices to acts of presentation of design. As the etymology of the word 'curator' derives from the Latin *cura,* meaning 'to take care of', it seemed to me that when thinking about the settings for engaging with speculation, that an ethos of care as a notion and a practice was important to spend time with. Therefore, curation can be understood here, not as a variant of a design practice or as an act of presentation of an existing design, but as an exercise that connects to a concept of care and that enables attention towards a multiplicity of care practices.

In looking for ways to become sensitive to how to care for speculation, I draw on the notion of care that has arisen in the work of feminist scholarship in technoscience as a sensitising concept. In particular, I draw on Maria Puig de la Bellacasa's work on "matters of care" as an entry point to ground this discussion (2011; 2017). Rather than developing a set of applicable methods for care, Puig de la Bellacasa is promoting 'an ethos of care' as a proposition to speculate with. Furthermore, feminist theory invites consideration of the practice, affect and commitment of care in SCD, and seems to make suggestions to take towards its curation – including developing situated and embodied experiences that seek to align speculation and care.

3 Care in feminist technoscience

The notion of care is typically associated with social support, welfare and health, as well as self-care. In addition, care is often understood as a practice of maintenance and repair that is feminized and predominantly gendered (Peace, 2017, p. 21); and one that has been at the forefront of a feminist concern with devalued labour (e.g. Precarias a la Deriva, 2006). Care as a 'labour of love' has been challenged and complicated by feminist practice through exposing the invisibility of carers and society's reliance on them, such as in the work on ethics and care by Carol Gilligan (1982) and her discussion of the moral and political work of care in the mother-child relationship.

Although I focus on the writing of Puig de la Bellacasa, there is a much broader set of literature to recognise here. A number of feminist scholars in Science and Technology Studies have been developing empirical and theoretical accounts of care over the last decade. There has been a sustained preoccupation with questions of responsibility, care and agency in scientific knowledge production; and a focus on practices of healthcare – such as in the work of Annemarie Mol (2008) in relation to patient care and choice; as well as care as a practice of tinkering and experimentation (Mol et al., 2010); and care in relation to environmental policy issues (Waterton, 2002) and farming practices (Singleton, 2010), to name a few. The work of feminist sociologists is important in elevating, rather than downgrading, mundane practices of care (e.g. Latimer, 2018). Puig de la Bellacasa's writing draws on care and ethics with Joan Tronto and Berenice Fisher; and enters into

dialogue with the work of Donna Haraway, Bruno Latour and Isabelle Stengers amongst others – work that includes a notion of care that extend from an anthropocentric view, to the pressing challenges in caring for fragile "more-than human worlds" (2017, p.1).

Through its circulation as a practice, care as a feminist concern is acknowledged as a slippery, ambiguous term; where care – or the lack of it – can be expressed in different ways, depending on who is describing it, and in what situation; and where caring for one thing may mean *not* caring for another, thus highlighting the contested nature of care (Tronto, 1993, 2015; Puig de la Bellacasa, 2017, p. 9). Part of the contribution of feminist theory to practices of care has been to acknowledge that the ambivalence of care is *useful*. As Puig de la Bellacasa also suggests, to try to summarise the plurality of the contradictory viewpoints would be a reductive act at odds with the liveliness of care (2017, p. 2-3). So, whilst ways of caring can be identified and empirically described, these multiple and polyphonic definitions are in themselves central to an ethos of care, where the complexity of care makes it usefully resistant to constraint. Central to feminist thinking is a commitment grounded in situated practices; concurrently, a situated approach – of how to care in each situation – becomes paramount as a way of thinking and doing care.

In her writing, Puig de la Bellacasa's aim is to suggest how care in technoscience and nature-cultures means more than the responsible maintenance of technology; and more than a feel-good attitude or "a moral value added to the thinking of things" (2011, p. 99). She describes caring as comprising three connected elements: it is an *affective, embodied phenomenon*, where transforming things into matters of care is a way of relating to them, of inevitably becoming affected by them, and of modifying their potential to affect others; and caring is also a *practical labour* – that requires getting involved in a practical way; and an *ethico-political commitment* that affects the way knowledge is produced (2017, p. 4-7).

Puig de la Bellacasa scans voices on care from different domains, and includes the voices of many other feminist scholars (2017, p. 2-17); but highlights an understanding on care by Joan Tronto and Berenice Fisher as central to her own ethos of care. Fisher and Tronto proposed an ambiguous notion for care to include: "everything that we do to maintain, continue and repair our world so that we can live in it as well as possible" (1990, p.40). Puig de la Bellacasa finds this 'generic' description useful for the purpose of her speculative exploration through care – and this connection of care to a speculative endeavour is pertinent to my enquiry also. First, Fisher and Tronto expose care as open-ended ("everything we do") and do not fix the location of care-giving to solely a human interaction, or limit the issues that should be cared about; second, as an act of 'maintenance and repair' they propose that care gives attention towards the ongoing, everyday practices of social reproduction; and third, they suggest that questions around the ethics of care, and how to care, need to be asked and speculated on ("as well as possible"), and therefore to use care *itself* as a provocation and an act of critique.

My decision to focus on the theory of Puig de la Bellacasa, in order to develop a reflexive account of practice, is due to the connection between care and speculation in her writing that make this literature pertinent to focus with – and to take to caring for modes of speculation, such as speculative design research.

4 Developing 'an ethos of care'

Drawing on the work of Puig de la Bellacasa, for my purposes, I will take up a number of points that put pressure on thinking about the care of speculative endeavours. First, the slippery, ambivalent nature of care is intrinsic to caring practices, and that this is useful. Care seems to demand a necessity of developing situated responses around issues of concern, and consequently, a resistance to developing methods of caring. Through this literature, I am persuaded that care insists upon an ethos, rather than a methodology of how to 'do' care (also see Mol, et al, 2010, p. 13).

Second, that care is simultaneously an embodied state, a practice of 'doing and intervening', and an ethical obligation. It engages hands-on action with affective and ethical implications – it has consequences – where transforming things into matters of care is a way of relating to them (Bellacasa, 2017, p. 5). A central question driving Puig de la Bellacasa's enquiry is this: "how can an ethico-political concern such as caring affect the way we observe and present things?" (2011, p. 100). If we understand, as Haraway described, that "it matters what worlds we world worlds with" (2011), and acknowledge that the ways in which we study and represent things can have world-making effects, then we need to be aware of what kinds of frames orient our caring acts. What counts as care? What is cared for, and consequently, what *isn't* cared for? And who, or what, is neglected?

For Puig de la Bellacasa, engaging with care requires a "speculative commitment to neglected things", that is, to "think about how different things would be if they generated care" (2011, p. 96). This engagement is described as a 'commitment' because care is attached to a situated understanding of care, that is affective, practical and ethical; and 'speculative' because it retains an openness on the specific caring requirements for each situation, instead of presupposing there is one way of caring. Therefore, when asking how care can contribute to the curation of speculative endeavours – or the act of framing 'another way' in order to pay attention to how things could be – this would, again, seem to insist that a situated, but open-ended response is required.

In the next section, I will describe a case study of a curated event – *Antarctica SE3* – that I have used to both explore and motivate my understanding of the literature from Puig de la Bellacasa. What I have been looking for are approaches that offer a more productive relationship with speculative acts and the settings of encounter. Instead of adopting engagement formats without consideration of 'what they do for SCD', could a more situated, germane and open-ended response – of how to care in each situation – foster speculation and care for an issue of concern? Could a self-reflexive orientation, to trace the relation of our position to our practice, highlight what or who is neglected from a speculative act?

5 Curating with care

To motivate an understanding of an ethos of care, the following short case study provides a description of a practice that attempted 'curating with care'. The one-off event was made outside the remit of a cultural institution, and took a situated (and sited) response to a speculative engagement with an issue of concern, namely, climate change. As I will describe, a relational format with multiple participants was developed, and the outcome of the speculative event, was left open-ended and unfolded over the durational frame. This format enabled participants tune-in to various positions around the issue of concern; and set out to give attention to the care of 'more-than-human' things: the care of a heatwave and rising C02 levels.

6 Case Study: Antarctica SE3

In September 2016, ten people local to south-east London participated in *Antarctica SE3*, meeting in Blackheath, Lewisham, and walking four miles south to Catford. This speculative work was conceived as a 'curated conversation' to mediate and care for a matter of concern around issues of climate change. Earlier that summer, the South Pole Observatory in Antarctica had recorded levels of carbon dioxide at 400 parts per million for the first time in four million years (Kahn, 2016); an indicator of our sore planet. At a local level, *Antarctica SE3* occurred in the hottest September since 1911 ("Highest September Temperate", 2016), a heatwave that could be described as both an actant and a mediator in a wider cascade of effects of global warming.

This event had a number of interconnected conceptual and practical proposals that connected caring about an issue of concern with the settings of speculation. First, how to situate speculation for rising C02 levels in Antarctica from this site in south-east London? How do climate change predictions manifest locally – could a heatwave be cared for? Second, what format could promote speculation

with and through these more-than-human things of gases and heat? And what formats enable a quality of self-reflexivity? Last, how to construct the abstract concept of 'rising C02 levels' as an affective experience? If a group of participants wonder about – and wander about – a heatwave, is this a form of embodied speculation?

Figure 1 Participants in Antarctica SE3, Blackheath. Photo credit: Gemma Lord

The connection to Antarctica also seemed to promote the format of a walk, or expedition; a format that is an "embodied presence in motion" (Solnit, 2014); one that speaks to tactics of collective protest and resonates with the psychogeographic wandering of Situationist International, or promenade performance experiences. Unlike a turn towards an 'active spectator engagement' (e.g. Ranciere, 2007), the participatory format was relational and conversational. It was designed to promote 'active listening' (Schrader, 2015, p. 673) or 'listening with care' (Puig, 2017, p. 58) through a semi-structured framework for group interaction, where the majority of the conversations were intimate ones between two people.

Figure 2 Participants in Antarctica SE3, Catford. Photo credit: Gemma Lord

The curation of the socio-material setting was carefully considered and existing artefacts and infrastructure were gathered to situate and motivate conversations at a number of points along the route. Although these chosen locations did not connect to the local implications of climate change as obviously as a flood barrier might, say; I wondered whether specific locations of south-east London could be connected to Antarctica through an almost parasitical overlay of materials, concerns and people, a sort of 'dumb' augmented reality; by *not* being in Antarctica; by people walking as an embodiment of an expedition, speculating through a place synonymous with climate change whilst situated in a heat wave?

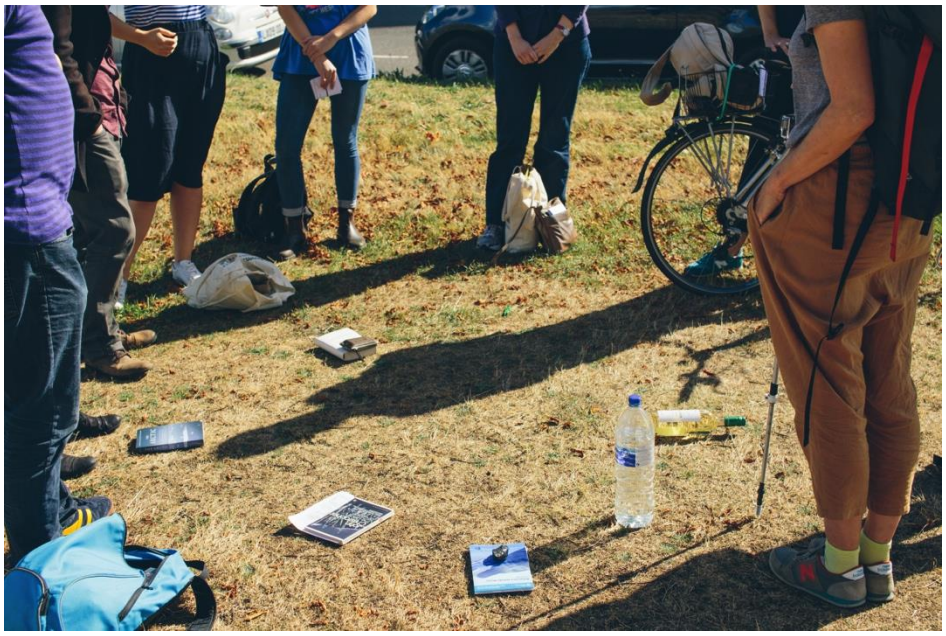

Figure 3 Participants materials of climate change. Photo credit: Gemma Lord.

Yellow hats, statistics, recording equipment, people, weather all gathered to situate a conversation in a durational and relational framework and to contribute a 'logic of materials' to the event (Lury & Wakeford, 2012). Participants were invited to bring a 'material of climate change' – including an electricity meter key, a bottle of English wine, a piece of coal from China, a bicycle, a worn t-shirt from Florida Keys reading "Silence in the Islands" – and these materials functioned both as prompts to open an initial conversation and enabled a degree of visibility around the various opinions on the issue of climate change.

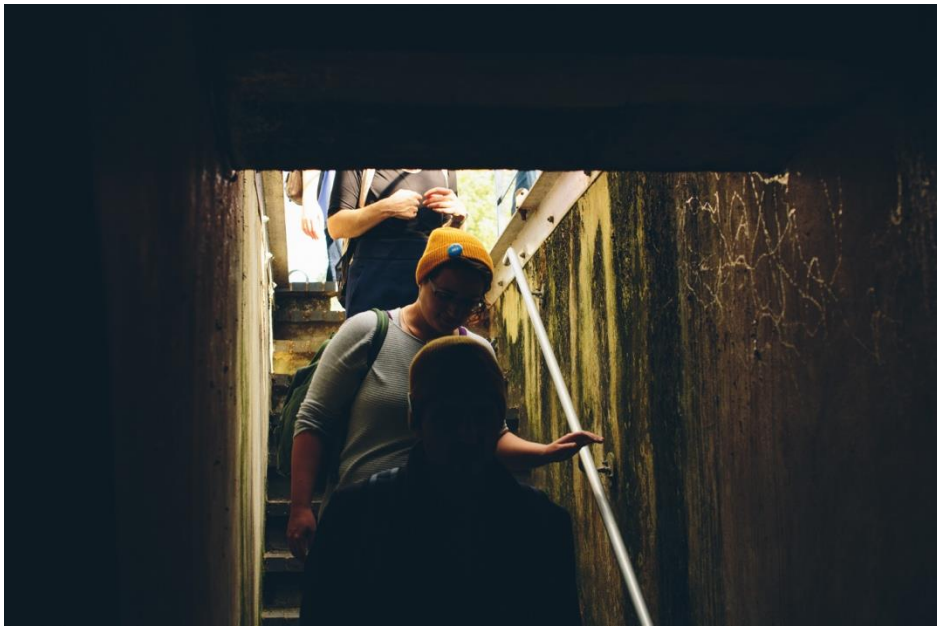

Figure 4 Underground Ice House. Photo credit: Gemma Lord.

7 Discussion: Caring for issues of concern and taking care of the possible

In one respect, the case study addresses how relational formats might afford modes of care, as well as exploring settings outside cultural institutions for their capacity to facilitate issues of concern. As I hope will be surmised from the description and following discussion of the case study, certain sensitivities raised in the section *Developing 'an ethos of care'* begin to resonate through reflecting on this activity, where qualities of situated-ness, embodiment and self-reflexivity around an issue of concern were given attention through the curation and the unfolding timeframe of the event.

Care has a contested nature, and caring for one thing may mean not caring for another – but this 'contest' is intrinsic to the notion of care; and because of it, care seems to have a resistance to repeatable methods where 'how to care' needs to be kept complicated. Situated responses are more appropriate for establishing 'how to care in each situation', to respond to the requirements of a particular empirical setting. Additionally, this chimes with a feminist curatorial approach of taking care in the curatorial role through 'attending to local urgencies' (Horne, et al., 2016, p. 124). Therefore, *Antarctica SE3* was an attempt to situate speculation around the complex global issue of climate change, within the context of south-east London; through configuring an existing heterogeneous network of humans, non-humans, more-than-humans, practices and spaces – including the heat-scorched grass of Blackheath common, the blue heritage plaques of two male Victorian Antarctic explorers, an Ice House, hidden rivers, petrol stations and paths unrecorded by Google.

An ethos of care that this activity produced was a relational way of connecting local conditions of extreme weather to rising C02 levels. For example, during the walk through the meteorological setting of a heat wave, a visit to an Ice House (a Victorian storage facility for food) was planned as a contrasting, embodied experience of a colder environment. Here, in a chamber underground, participants discussions reflected on the environmental impact of the shipping of imported ice required to store food; and there was discussion about Antarctica as a location of fantasy, historically, a place to project myths and legends. This relational frame that connected human participants and more-than-human things, resonates with Puig de la Bellacasa's proposal that "transforming things into matters of care is a way of relating to them" in practical and affective ways (2011, p. 90; 2017, pp. 5-6).

Then, care also suggests an on-going self-reflexive ethos for understanding the frames that orient our caring acts, of what is being encouraged to take care of, and how. By staging assemblages of relations to explicate configurations of care, questions can be asked about who and what is, and is not, assembled. Whilst this was a small group of participants (who were friends, or who had seen the event advertised through social media; and included a Transport for London worker, a Green Party activist, a gardener, a curator, a designer), they were given opportunities for acknowledging the various positions or experiences they brought to the issue of climate change. The self-reflexivity of participants was paramount, especially given our relative privileged situation in London; as the impacts of climate change are unevenly distributed, and rising sea levels, rising air temperature, storms, flooding, extreme weather and under-nourished soils, create unbearable living conditions for many.

Therefore, opportunities for self-reflexivity were afforded through the intimate conversations of the relational format, as well as through the personal descriptions of materials brought to the beginning of the event. Here, for example, one participant brought an electricity meter key to describe her need for a direct financial relation to her power consumption; whilst another participant brought a bottle of English wine as a material to talk through his opinion around the benefits of climate change and the changing patterns of crop production – a reminder of the diversity of opinions in the ecology of this issue. Although this event took place outside the settings of the gallery or museum, 'neglected issues' of gender, class and race were raised – for example, prompted by a blue heritage plaque commemorating a famous male Antarctic explorer, participants initiated a conversation around geopolitics of 'unsettled' land, and the colonial narratives connected to expeditions in Antarctica. Eating food of dry Antarctica 'sledging biscuits' prompted conversations around food conservation and production, as well as cereal crop failures that year.

In addition to qualities of situated-ness, embodiment and self-reflexivity, another quality or attitude that the literature on an ethos of care describes is that of an ethico-political commitment; that is, to *generate* care through an act of concern. But did this happen in *Antarctica SE3*? If the point is not only to expose or reveal 'neglected things' for care, but also to generate care (Puig de la Bellacasa, 2011, p. 94) and to both be affected and to affect others; then was it enough to make a space for criticality and speculation through this short, single event? Was this 'engagement', and is engagement the same as care?; or does care require something else, a different mode of practice that enables an ethico-political commitment? As STS feminist Astrid Shrader asks, "What is the relationship between knowledge and affect?" (2015, p. 671), or between knowing that we care about something to becoming troubled by it?

Therefore, I suggest that a further challenge for the curation of speculation endeavours – and that can also be found in literature from Puig – is that "we must take care of things in order to remain responsible for their becomings" (2011, p. 90). Not only does Puig de la Bellacasa make the argument for doing more careful acts of speculation, in territories that may be neglected in some way, and to attend to situated and urgent matters of concern; but that this attention of care extends to taking seriously what becomes through them. I see that there is possibility for attaching "taking care of the possible" (Bordeleau & Stengers, 2010,p.12) to the *curation* or care of acts of speculation. Through 'caring for' acts of speculation, should we attend to what we are *and* what aren't we speculating about? And would the care of speculative endeavours ask us to pay attention to both?

8 Conclusion

If we take seriously the criticism that the dominant settings for speculative and critical design – such as exhibitions in art galleries and museums – may impose curatorial narratives that problematize who is represented in 'debates on futures', and how; then we – as feminist design researchers – should also consider alternative paradigms for caring for speculation. As an activity that already contains the concept of care, I suggest that curation offers up an opportunity to explore a

multiplicity of care practices. Therefore, to expand an understanding on care, I have drawn on literature from feminist technoscience on "matters of care" that I see as productive for this purpose, to point to key features of developing an ethos of care.

In this literature, a notion of care as 'good intentions' is dismissed (see also Tronto, 2015). Here, care is described as simultaneously an affective, practical and ethico-political act; and I suggest that this sensitises curatorial practice with a feminist notion care in a number of ways. First, it suggests a move towards embodied interactions that seek to foster affect and generate care through concrete, practical acts. Second, rather than a fixed or replicable methodology for caring practices, it suggests that care requires a situated approach that asks, 'how to care in each situation'. Third, care also demands the development of an ongoing self-reflexive ethos for understanding the frames that orient our caring acts, and this includes looking for places where care may be overlooked or neglected. I have used the points raised in the section *Developing 'an ethos of care'* to reflect on a practice case study, *Antarctica SE3*, that offered a situated curatorial paradigm for speculative engagement with an issue of concern of climate change.

Finally, not only does the literature make the argument for doing more careful acts of speculation, in territories that may be neglected in some way, but that this attention of care extends to taking seriously and responsibly what 'becomes' through them – and this is what I understand within Puig de la Bellacasa's argument for the ethico-political commitment involved in care practices. In addition, therefore, I see that there is potential for attaching 'taking care of the possible' and a responsibility for what becomes, to the *curation* or care of acts of speculation.

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Section 6.

Not Just From the Centre

DRS 2018 Design Research Society 2018 Catalyst

University of Limerick
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Editorial: Not Just From the Centre

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There is a popular West African proverb that states that 'until the lion has his or her own storyteller, the hunter will always have the best part of the story'. Much literature on design practice and education focuses on the experience of designers in Western Europe and in North America, which we can name The Centre. The focus on the centre would make it appear that there is little to no noteworthy design practice and thinking outside of these regions. Even when literature about design draws attention to design practice from outside of The Centre, these stories are often still written from the perspective of the West, and not from the perspective of the people who are being written about. For this track, therefore, we made a specific call to designers and educators outside of the 'centre' of Western culture, designers from Eastern Europe, Latin America, the Caribbean, Africa and Asia. We intended to create a platform for these designers to tell their own stories, share their work and to spark debate on how design practice and education are impacted by cultural and geographical context. We felt that a design conference called 'Catalyst' should not take place without a specific call to encourage discussions about design in 'emerging countries' and that these discussions should be led by research from designers from these places.

"Culture comprises a society's philosophy about the nature of reality, the values that flow from this philosophy, and the social customs that embody these values" (Little Bear, 2000, p. 77). Design practice can be understood as the medium between values and ideals of a culture and the tangible reality (Buchanan, 2001; Tunstall, 2013). Since many discussions on design take place in the centre of Western culture, western designers often disregard the role that culture plays in the design process, and the cultural aspect of design is taken for granted. It is important to debate how design thinking and practice changes under different cultural values and ideals. Analysing and understanding design from outside The Centre creates a platform to shed light on some aspects of design activity that have not yet received much attention in design literature.

Political and economic terms such as 'advanced, 'emerging' and 'developing' divide 'us' into the ones who are better and the ones who are not 'good enough'; the ones who are always right and are the experts, and the ones who have to learn from the West and 'have to catch up' (Hall, 1992; Santos, 2016). This also applies to design practice, research and education. Design students from all over the world learn about European and North American design practice, while design practice from other places is often ignored. As a result, they are conditioned to believe that what is from The Centre is good, and what is from outside of The Centre is not good enough. Regions outside The Centre are seen as limited in resources, and in The Centre it is often assumed that affluence is conducive to well-being and innovation. In partnerships with international designers, local innovation, creativity and solutions are often stifled by the influence of external experts and this impacts the long-term practice and creative confidence of local designers.

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In emancipatory research, there is the epistemological assumption that knowledge is defined from multiple cultural lenses while there is also the acknowledgment of issues related to power (Mertens, 2015). One of the aims of emancipatory research is to include excluded perspectives. This track is emancipatory in nature, and we sought to highlight diverse global perspectives on design education, research and practice. We wanted to understand the perspectives of these designers, how they use existing resources (or lack of resources) to trigger creativity and innovative solutions. We wanted to know how local values and traditions were used as a catalyst for their designs. Finally, we also sought to understand how happiness and emotional intelligence could play a role in the development of a new and more inclusive form of well-being that is not dependent on perceived material affluence.

Designers and educators from many countries across Latin America and the Caribbean, Africa, The Middle East, Eastern Europe, Asia and Oceania responded to our call for papers. The papers covering a wide range of topics and the selected papers can be divided in two parts. The first section focused on design education and methods, and the second part focused on culturally situated design practice.

The first two papers look at design education in different contexts. In the first paper, Barbadian design educator Mayers looked beyond tertiary level design education and examined some of the challenges that Barbadian design students have in continuing to develop their projects after they leave university. While Noel and O'Neill looked at a role for design education in times of crisis as they described the experience of developing a curriculum that was used in a design class that started two weeks after Hurricane Maria destroyed Puerto Rico in 2017. The design class provided an opportunity for future scenario building, hope and optimism in the midst of chaos. Yemtim et al., moved the discussion from education to research methods in their paper where the authors examined how 'design methods' could be transferred across cultures by describing their experience in Burkina Faso.

The final four papers on culturally situated practice follow the papers on design education and research. Wahyurini proposed a framework to understand factors that restrain the engagement of users with collectivist culture background to computer technology. Hu and Dong examined the role of consumers as readers who play active roles in the dynamic structure of communication and discuss how cultural factors affect consumers in reading design. Estwick sought to establish principles for good Caribbean design and establish a case for design in local cultural policy in West Indian islands. In the final paper, Veilande addressed various research issues regarding the (non-existent) fashion industry and aspects of sustainability in meeting citizens' everyday needs in the Soviet Union.

We hoped with this track to contribute to increasing recognition of the value of design practice outside The Centre. On one hand design literature needs to recognize the work of designers in peripheral regions not only as a curiosity or exoticism but as important contributions to contemporary material reality. On the other hand, comparisons between design practice in different cultures might allow for a better understanding of the cultural aspect of design activity.

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Challenges in Barbadian Design Education – When Graphic Design & Product Development Collide

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The Barbados Community College's BFA Programme in Graphic Design has been in existence for over 20 years. The year 2009 marked a shift in design application, with pockets of students using graphic design as a catalyst to develop products that are potentially marketable. The current economic climate has made it harder for students to be employed in agencies and studios. One would anticipate that they would follow through in creating new spaces for themselves as designers, i.e. developing products as viable sources of income in a struggling economy, but sadly most do not. Through an exploration of case studies ranging from plush anthropomorphic toy letters, and interactive Caribbean storytelling, there must be some revelation on how best to harness this talent. How should the bridge be built for further training so that the product enters the commercial market? Are there socio-economic and psychological factors, which create this gap in idea to enterprise? The aim of the paper is to investigate why graduates are not pursuing self-initiated projects as profitable business ventures, and to offer viable solutions for how this can be achieved.

product development, graphic design, Caribbean culture, education

1 Introduction

Barbados is an independent British Commonwealth nation densely populated with 285,000 inhabitants within a 166 square mile radius. Land is precious and pricy, and finding employment remains competitive.[1] The Barbados Community College (BCC) was formed in 1968 by the Government, as a means of educating and providing employment opportunities for the people of Barbados. Prior to this date, employment by way of the old colonial apprenticeship model offered little scope for growth and financial wealth. Thus, the establishment of the BCC and the BFA degree in Graphic Design, was timely and visionary. The school has exceeded its initial capacity in student enrolment and course offerings therefore leading to challenges in plant capacity. The plant for

[1] Umemployment rate in Barbados: 2017-10.2%, 2016-10.2% - www.tradingeconomics.com. Barbados Statistical Service: 2015 – 11.5% - www.barstats.gov.bb

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Graphic Design is small and in turn the student enrolment averages twelve new students per year. This number has recently plummeted with the introduction of tuition fees for all undergraduate programmes. Limited studio space is further compounded by obstacles, such as insufficient equipment, and a budget too small, to meet essential operational needs. Despite these challenges, our students continue to produce at a reasonably high standard. Many students who have graduated have gone on to work in agencies, studios, and as freelance designers, creative directors, art directors and so on. In essence they are gainfully employed, where we typically imagine them to be.

Being the only undergraduate programme in Graphic Design has placed the department in a very unique position at the forefront of design in Barbados. As students seek higher learning along with their varied interests, the programme has sought from its inception to tap into the multifaceted talents of those enrolled. Normally in international art institutions degrees are specialist. For instance, programmes such as BA Illustration, BA Film/Video Production are degrees in their own right. Due to the limited space of the entire Division of Fine Arts the school must also be mindful of 'over offering' other art degrees, as enrolment will be significantly lower. The programme allows the students to explore what are normally considered specialty areas in the arts, as both modules and singular projects thereby creating a version of the 'interdisciplinary area of design'. For instance, if a 'core' graphic design student is not as capable of creating illustrations, but must complete the task requiring those skills, they can be expected to find ways of resolving this challenge, irrespective of the other students who may have a flair for illustration. Essentially, the student who could pursue a successful career in illustration sits in the same space with the student who does not fully possess the skills to illustrate.

Components within the programme include:

1. Creative Writing
2. Illustration
3. Digital Photography
4. Design Management
5. Web Design
6. Video – Film & Script Writing

Since the aforementioned subjects are undergraduate disciplines in their own right, to those outside, this approach may seem like a ludicrous consolidation of disciplines, when one considers all the components or arms within the field of Graphic Design. It is this interdisciplinary blend, which allows the students to flex their creative muscles. Barbados still remains a 'jack of all trades' culture. The students brief exposure to the full range of disciplines, allows them to better survive as practitioners outside of the college studio setting.

The case studies introduced in this paper are a *by-product* of the Department's design theory and practices. By-product in this context signifying: the synthesis of graphic design and product development, by a select few. The objective of this paper is to critically look at the forces in play, which may either help or hinder our graduates from getting their products onto a commercialised platform. Although there will be some mention on the application of cultural identity in the work, it is not the driving force of the paper, but provides context for revealing some perspectives on the work. The case studies are introduced with project descriptions and illustrations, followed by a summary of responses gathered from the interviews. The inclusion of some dialogue gives the reader a sense of the process and challenges in the student's own voices. Moreover, challenges with psyche and the positioning of local entities with regards to support, will be discussed at length, followed by solutions on the best way forward.

2 Methodology

Empirical research is integrated with six case study projects that demonstrate recent developments, within the past nine years under the BFA in Graphic Design. A series of twenty- to thirty-minute

interviews with five graduates were conducted on their experiences, whilst undertaking their respective projects, along with their thoughts upon finishing the programme. Very little research has been done on the development of Graphic Design in the Eastern Caribbean region, and furthermore, pertaining to a trend such as this one. Therefore, these case studies can contribute to the body of knowledge on design practice in the region. They serve as critical indicators of the heterogeneity of the programme, and highlight both the significance and value from a potential market perspective. One out of the six case studies has achieved success but there must be an analysis of the variables on why this is so.

The following questions guided the interviews:
Line of Inquiry to Graduates:

1. Describe your project.
2. What was the driving factor that made you create the product in the first place? (Considering the nature of the programme).
3. What were the most challenging areas of the project?
4. You have reflected on your work. What would you have done differently with regards to the product you created?
5. Did you make it a point after graduating, to research if there are any organisations, that could have assisted you with regards to developing, manufacturing and getting your product to market?
6. If approached by a prospective investor, would you sell your product to them?
7. Other details such as residential status and current job title have been recorded.

The case studies have been evaluated and pulled together in a summary.

3 Cultural Signposts – The Products

Saga clearly indicates how national identities are formed through a series of socio-global phenomenon and diaspora:

> *Several post war events have helped to boost the development of culture nationalism in the region. They are the independence of the Anglophone Caribbean, migration, mass media technologies, the black power movement in the United States and the Cuban Revolution. Race played a more significant role in the formation of national identities in the Anglophone Caribbean than in the Hispanophone islands. (2001, p. 250)*

As stated in the abstract, we are seeing pockets of students eager to assert indigenous cultural form through Caribbean and Barbadian folklore. Those who seem to demonstrate this interest speak of family who have instilled pride and appreciation of things cultural. Identity is deeply rooted through organic means and its survival is not fully bolstered via post-colonial institutional means. Although this trend has been occurring, a parallel can be seen with some students solving tasks under the proverbial guise of Eurocentrism[2]. Conditioning still runs very deep. (Figure 1). According to Nettleford:

> *In an ex-colonial society doused in colonial attitudes and mores, old practices of colonial vintage die hard. (1979, p. 20)*

[2] Eurocentrism is the practice of placing emphasis on European (and generally Western) values and culture at the expense of other cultures.

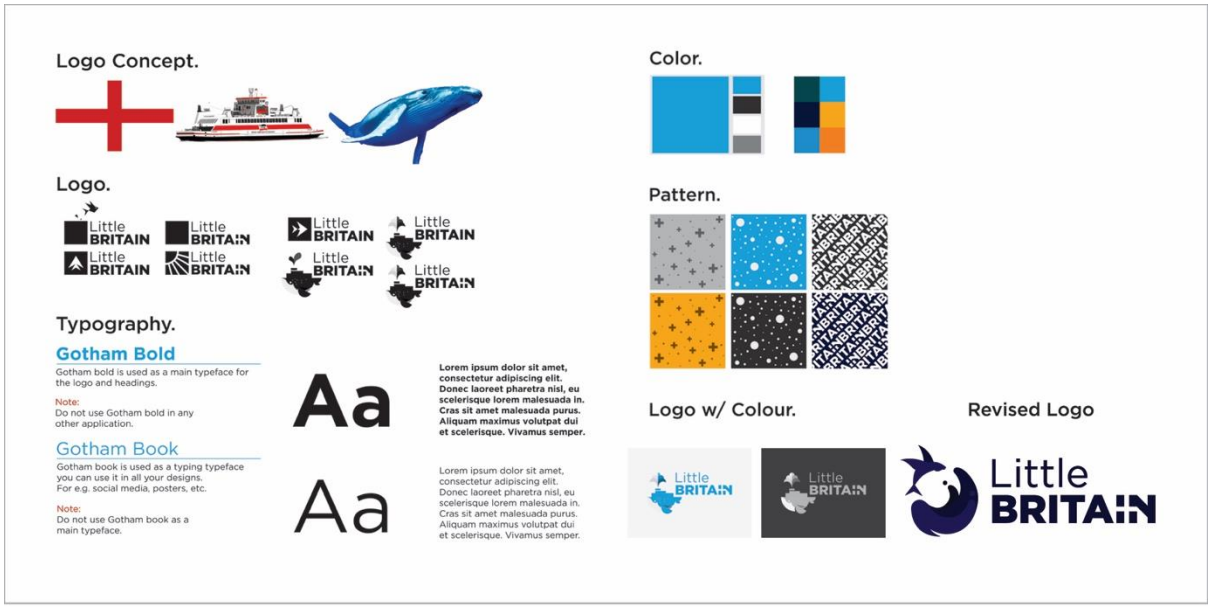

Figure 1: Cultural penetration personified. A first year student adamantly sticks to the name 'Little Britain' for a local ferry service. 'Little Britain' is 'Barbados's old colonial nickname. After two tutorials on the notion of changing the name to fit the modern context in which we reside, the student concedes to remove the whale but holds on dearly to his brand name. National colours were explored and eventually abandoned.

Indeed it is stirring to the soul, to view what is classified as a spirited curiosity in cultural identity, manifests itself in the hankering for ancestral tales and symbols, never losing authenticity.
The following case studies include a brief description of the project with illustrations. We have observed the emergence of two definitive streams of interest within the product development context of which we attempt to define as:

1. Cultural revival – Caribbean folklore with Barbadian infusions, the latter in particular, emphasizing notions of contemporary and historical references along with interpretations of the physical environment.
2. Mainstream concepts – Commercial products that exude international mass appeal.

3.1 Ref. 1 - Phantom Haven-Divine & Darkness – A Publication

'Phantom Haven' is a reference collection of thirteen evil entities from Caribbean folklore culture. It is a depiction of how these creatures became evil phantoms, as well as those who had sold their souls. For instance, the legend of the 'Soucouyant'[3] from Dominica, Trinidad and other territories, and the 'Steel Donkey'[4] creature who originates from Barbados. The intriguing concept of 'Phantom Haven' is compiled in a printed publication and interactive platform, with each folklore character unveiling a perpetual life of loyalty, hatred, obedience, respect, trust, etc. which is conveyed to the audience. The lack of virtues intertwined with the victim's fears and feelings of guilt disciplines them. Ultimately, Phantom Haven encourages and illuminates a divine perspective on these legendary folklore spirits, teaching audiences the importance of morals.

[3] The 'Soucouyant' found across the Caribbean region is an evil, old wrinkled hag, who by night sheds her skin and becomes a roving ball of fire to seek out victims, especially babies whose blood she sucks before returning to her skin.
[4] 'Steel Donkey' is a legendary supernatural creature of Barbadian origins, whose presence is manifested by the jangling of metallic sounds and other strange occurrences.

Figure 2a: Ref. 1- Phantom Haven-Divine & Darkness. 'Phantom Haven' logo and the tale of 'Soucouyant' in a double page spread. Design and illustration by Andre Trotman

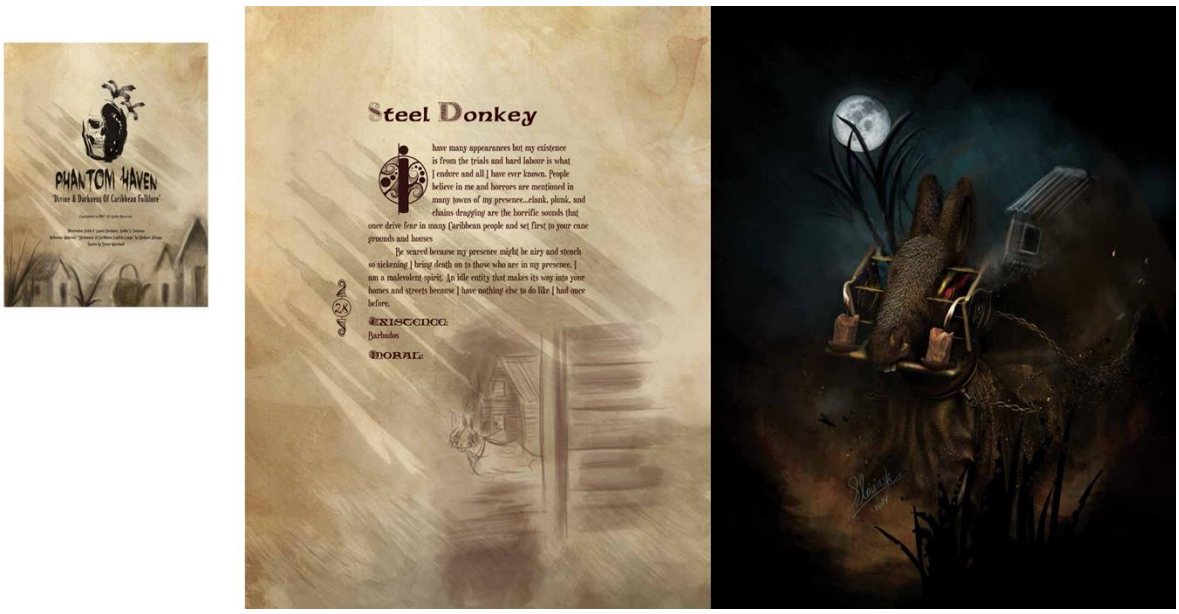

Figure 2b: Ref. 1- Phantom Haven-Divine & Darkness. 'Phantom Haven' opening spread and the tale of 'Steel Donkey' in a double page spread. Design and illustration by Andre Trotman

3.2 Ref. 2 - Mongoose Playing Cards

'Mongoose Playing Cards' are presented as whimsical illustrations split into four categories: Folklore, flora, fauna and places of interest. Other indigenous information on the island of Barbados has been included in a matching booklet.

Figure 2c: Ref. 2- Left: 'Mongoose Playing Cards' kit, which comes with a keepsake booklet on Barbadian heritage. Right: The notorious Rachael Pringle owned slaves, a tavern and the Royal Navy Hotel, which was essentially a brothel in the capital of Bridgetown.

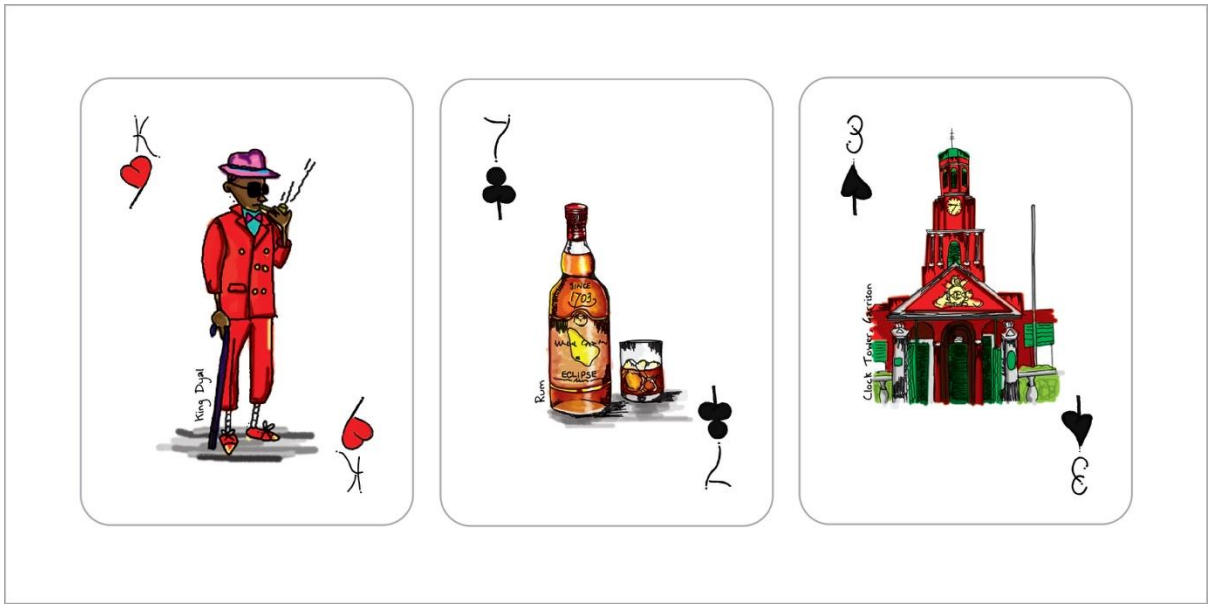

Figure 2d: Ref. 2- 'Mongoose Playing Cards'. Left: The late 'King Dyal' a dapper Bajan who frequented social events particularly the game of cricket at Kensington Oval. Centre: Considered the national social beverage, a bottle of rum accompanied with a tumbler. The designer uses the 'Mount Gay' brand of rum as the marker. Mount Gay Rum Distilleries boasts over three hundred and fifteen years of history and is said to be the oldest distillery in the western hemisphere. Right: The 'Clock Tower' at St. Ann's Garrison, the signpost of the British Militia. Design and illustration by Sheba Phillips

3.3 Ref. 3 - Mass Anthology – A Graphic Novel, Volume 1.

Mass Anthology is a graphic novel of Barbadian content targeted at readers of fiction. It is a collection of illustrated stories by the director and his peers, which brings the novel together. Stories such as 'Babylon' and 'Steel Donkey' can be found in the collection.

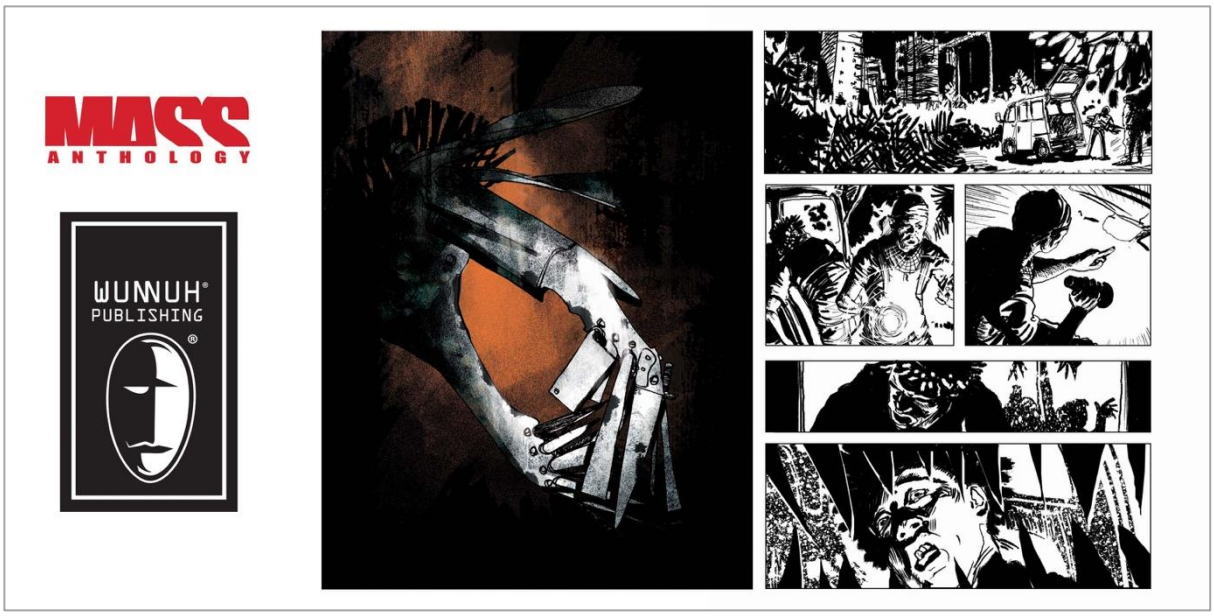

Figure 3: Ref. 3- Left: 'Mass Anthology's' graphic novel masthead and 'Wunnah Publishing' logo. The word 'Wunnah' means, 'all of you' and its origins can be traced to the Igbo people in West Africa. Right: 'Steel Donkey' is reinvigorated in an opening spread. Design and illustration by Matthew Clarke

4 Cultural Signposts 2 – The Mainstream Products

The following products fall into the *mainstream* categories as mentioned is Section 3.

4.1 Ref. 4 - Cozees – Plush Toys

'Cozees' is a toy line of plushed toys or 'plushies'. The initiative comes from a mixture of work and play, and targets children ages 2-7. The toys are developed from alphabet letters and brought to life further by adding human characteristics. Choose your favourite 'letter' from the collection and it comes packaged with crayons and a colouring book. Over time, you can build your own collection. 'Cozees' make great gifts and are for those avid plushie collectors looking for unique items. Most importantly, the 'Cozee' product stimulates play whether at kindergarden or home.

Figure 4: Ref. 4- Cozees Plush Toys. The lower-case letter 'T' takes on anthropomorphic qualities. Graphic design and product design by Sonya Goddard

4.2 Ref. 5 - The Great Chair – Portable Seating

'The Great Chair' is a portable multifunctional piece of furniture that can be used both as a table, stool and chair. It can be folded compactly for easy carrying and storage, and used for indoor and outdoor activities. This furniture piece comes with dynamic surface skins inspired by Barbadian flora and fauna, adding style and character. Some of the colourful skins refer to 'Carambola Fruit'[5], the 'Bearded Fig Tree' and the 'Hawksbill Turtle'.

Figure 5a: Ref. 5 - The Great Chair. Left – A bold pattern inspired by the endangered hawksbill turtle. Right – The carambola fruit is expressed using a warm palette. Graphic design and product development by Sheba Phillips

Figure 5b: Ref. 5 - The Great Chair. A complete collection of bold skins inspired by nature. Graphic design and product development by Sheba Phillips

[5] *The carambola is a tropical tree that grows ovoid shaped fruit resembling a five-pointed star. Variants of the name can be found in the West Indies such as 'five finger.'*

4.3 Ref. 6 - Own It – Hair Dye

'Own It' is a line of bright and fun coloured hair dyes. It is targeted at College students and young adults and for those who are young at heart. The range is uniquely packaged in test tubes, which are transparent allowing the consumer to see the colour of the dye.

Figure 6: Ref. 6 - Own It Hair Dyes. Bold fluid graphics bring the product to life with unique packaging. Graphic design and product design by She'nique Clarke

5 Case Studies Summary

The six interviews conducted showed compelling results, forging a way toward relevant solutions for the obstacles of industrial development. *(N.B. Two of the case studies Ref. 2 - Mongoose Playing Cards and Ref. 5 -The Great Chair are from the same graduate).* Whether it is Caribbean ancestral tales, iconography or local characters, the stories are generally passed on intimately through oral traditions. Students proudly explore the notion of identity whether that may be from a holistic perspective or from a localised point of view. Case studies such as: (Ref. 1 -Phantom Haven, Ref. 2 - Mongoose Playing Cards, Ref. 3 - Mass Anthology Graphic Novel) may be classified as viable *cultural* commodities. Meanwhile mainstream products from, Ref. 4 - Cozees Plush Toys, Ref. 5 -The Great Chair, and Ref. 6 – Own It Hair Dyes generally expressed their inspiration through personal need. The latter three studies were verbally supported best by; Ref. 4 – Cozees Plush Toys that, "I wanted to design something that becomes part of your life." *(Ref. 4 Cozees Plush Toys).* Of particular interest is Ref. 5 – The Great Chair, which beautifully straddles indigenous signifiers, form and function.

The responses on whether participants had researched establishments that could assist them in their venture proved less than favourable. The majority gave up due to external factors, or simply abandoned their venture, after having obtained full time employment. The following quote shows the absolute best case of unrelenting pursuit that fell short of its goal.

> *While I was still at College, I sourced test tubes from abroad to achieve the look I wanted but I incurred cost. Also I had challenges with the function in terms of getting it to stand correctly in the outer packaging, in addition to presenting it correctly to the consumer. Now I would change from glass to plastic tubes as during opening night of the show, test tubes fell off the table, broke and the colour ran all over. Immediately after College, I contacted a well-known laboratory in Spain to get them to mix the colours. I sent numerous emails and never got a final cost from them. I asked them, "How do you want to be paid? How do I get a sample?" Also, I made a request for minimum quantities, but no answer. I tried another company in China but the minimum volume was too high, at 2000 units per colour, which is too much for*

me as a start-up. I tried also to work with a chemist in Trinidad, but they said that they would only mix particular pigments, red and brown tones. The quality of the dye was not vibrant and very watery. By then my spirit towards my hair dye project was gone. (Ref.: 6, Own It Hair Dyes, 2017)

Unanimously, the participants agreed that they wanted to develop the project further and that they had additional ideas on how to creatively expand the projects. Some responses included:

I would like to finish the entire 26 letters of the alphabet. I would also have to look into manufacturing elsewhere, but I got so caught up in trying to work on my graphic design business day to day, pleasing clients, making money and so on, that I lost the passion to create and work on the other things I love. (Ref.: 4 - Cozees Plush Toys, 2017)

Of worthy note, four out of five graduates have not registered the brand name of their product as a safety measure in the absence of securing a patent. The Corporate and Intellectual Property office sells trading names for one hundred Barbados dollars, the equivalent of fifty United States dollars.[6] The lack of foresight in protecting their interests (in the meantime) is baffling. Graduates in the study have monthly income and have been working for more than three years.

Feelings were mixed with regards to selling the idea to an investor. Some of the perspectives included:

No. They may not fully execute or hold on to the vision I have for it. They may not want to keep the look and feel, which is the essence of 'Phantom Haven', so I will work on it slowly and steadily until I have built enough income to launch it myself. (Ref.: 6, Phantom Haven, 2017)

Give me a proposal and I would seriously go over it. I'll think about it… but really 'no' because if you see the potential in my work, why can't I? (Ref.: 6, Own It Hair Dyes, 2017)

5.1 Ref.: 3 – The Story of Mass Anthology: A Graphic Novel

The challenge the director of 'Wunnah Publishing' faced initially was the coordinating of pulling together the illustrators and writers in a timely manner. On reflection, the director would have done a short story upon leaving College. No series, no anthologies. While at College, he saved his money from freelance work, and looked into professional printing locally. At his graduate show the publication almost sold out within a week. Once he graduated he decided to print the next run overseas. Intrinsically printing is not an obstacle, as it is a readily sourced. It is worth noting that the Barbados Investment Development Corporation (BIDC) approached him to undertake a course in building a business, but he declined as the course was offered during the week, clashing with his full-time job. He conceded that had they offered a weekend course, he would have participated in the programme.

'Beyond Publishing Caribbean' has room for expansion. All the comics can be accessed at the Comic Con Convention in New York City. They have a representative who manages a booth, which informs patrons to purchase either printed comics, or access them online. He aspires to make a film, cartoon or game from the 'Hard Ears' series, a contemporary interpretation of Barbadian iconography. If approached by an investor, he would consider selling the franchise depending on the price. He is fully aware that down the line, he will have to compromise on the development of some of the characters in order to tap into the international market.

This director has defied the odds by turning a passion into a business reality. The amalgamation of 'Wunnah Publishing and 'Beyond Publishing' has produced over thirty graphic novels since 2009. Their primary markets include the Caribbean, USA, Canada, Russia, Great Britain and Brazil. Setting

[6] Corporate Affairs & Intellectual Property Office: https://caipo.gov.bb/site/index.php/fees/article/65-business-name-application

up 'Beyond Publishing Caribbean' allowed some of his friends as well as colleagues to publish their work under this name. Matthew and his team promote the company heavily via social media channels. The works of 'Beyond Publishing' can be accessed on multiple platforms, i.e. print and digital options are available. Unlike the three of the six case studies shown, his only physical material was paper and online media. We must recognise that access to 'new or alternative' materials was a struggle for those working with toys, furnishing and beauty products, and that access to manufacturing for example, plush toys and the engineering of hair colour, poses unique challenges locally.

To summarise, an action plan needs to be set in motion to solve some of the manufacturing issues. 'Ref.: 3 – Mass Anthology: A Graphic Novel' is the success story of the six case studies, and shows an outcome with a *collaborative* approach. He simply brought others along with him. The other graduates worked in an insular manner, with virtually no result to propel them to the next step.

6 Strategies In Motion: On the Cusp of Micro-Evolution Through Coursework

Though microscopic on the Graphic Design programme, attempts to accommodate product development have begun. The courses are 'Typography I' delivered in the first year and 'Professional Challenges in Design' delivered in the second year.

6.1 Typography I

Thus far, the interplay of graphic communication and product in Typography 1 has been introduced on a minor scale allowing students to 'play' with the aesthetic and functional qualities of letterforms, which they create through a hybrid alphabet exercise. The task is to study existing letterforms and reinvent new language via form. The exercise is essentially type as image and artefact. The results have been mixed with some students solving just enough to get through that component, (those who have little interest in the area of product or three-dimensional application), while others immersed themselves in the exercise attempting to create interesting product ideas whether it was a strength or not.

6.2 Professional Challenges in Design

The earlier course outline of 'Professional Challenges in Design' allowed students to reflect on their Practice, through a series of visiting professionals within the field of advertising and graphic design. The course is now tailored to function as a foundation in the 'Art of Developing a Business Model', with the official course name still intact. The Department has formed a partnership with the Barbados Youth Business Trust[7] (BYBT), a private sector initiative that offers a dynamic entrepreneurship programme to enable underserved young people via entrepreneurial skills development, advisory and marketing support services, business mentoring and start-up capital. The BYBT delivers the second phase of the course. Students individually generate a business model and address issues such as time management and value sessions related to legal requirements, intellectual property and copyrights. Of particular significance is the inclusion of record keeping and basic accounts (VAT/NIS/Taxes).

7 Discussion

A discourse must be undertaken on the infrastructure and the notion of access with regards to design, manufacture and policy in Barbados. Amir looks at *design in the third world* from the perspective that:

[7] Barbados Youth Business Trust - https://www.youthbusiness.bb/

> *… A more comprehensive formulation of the concept of design for the Third World should begin from an understanding of the complex interrelationship between design and social, cultural, and political factors. (2004, p. 69)*

An attempt will be made to pinpoint problem areas. How can a proactive and constructive pathway be created from inception to implementation of these graduate products? It is evident that more research needs to be undertaken.
Findeli who speaks on the issue of *rethinking design education* in the 21st century reveals that:

> *Today, everybody tends to agree upon the necessity of including art, science, and technology in a design curriculum. But disagreement will soon arise, on the one hand, as to the relative importance, and on the other hand, as to their respective function, i.e., the way they should be articulated. (2001, p. 8)*

The aforementioned quote speaks to the notion of striving for balance, while pursuing research in multidisciplinary fields.

7.1 Manufacture Issue

The biggest challenge is that there is no access to a space for the student to further engage in 'play' and let alone manufacture. There needs to be a specialised programme with a focus on testing and prototyping, that by extension permits successive stages of refinement, before seeking capital and going to market. If your industrial design has a variety of components, one is expected to 'move around' to build the prototype and in some cases it may not be even feasible to construct locally. The steps and labour involved can prove to be costly.
The manufacturing sector is very small. If we refer to the case studies summary with regards to responses to 'funding, research and manufacture', this gives us great insight that there is a persistent mentality, that if you are to make any type of progress that you must 'do-it-yourself' (DIY), somehow. This attitude of trying to get it all done on one's own terms appears to be distinctly a Barbadian ethos, particularly if you are a budding small business owner.
Supporting the statement on exorbitant prototypes and 'small man mentality', the Executive Director of the Barbados Manufacturers' Association explains:

> *The biggest challenge in manufacturing is the overhead costs with regards to utilities, materials and services in general. Barbados is the most expensive country in the Eastern Caribbean. We have many companies that do well in manufacturing but not enough is being done to promote their success stories. We would like to offer an official partnership with the students of the BCC particularly in the field of art and design. We are campaigning for more schools at secondary level to be more entrepreneurial well before they enter tertiary level education. They shouldn't have to wait until tertiary level to understand the creative process and footprints of good business. We are also facing some perceptions with the public, that only big businesses are our primary interest. We are here to embrace and help everyone generate income, even 'the little person'. (B. Mckay, 2017)*

Continuing on the subject of manufacture, we have two ensuing challenges. The development of industrial products is low thereby the acquisition of hardware and software tools needs to be selected with care, as there could be the risk of the under utilisation of equipment. If we look at the comprehensive contributions of Centro Brasil Design (CBD)[8] and the Brazilian Government's 'Diagnostic Review of Design in Brazil', they reveal the same obstacle that Barbados could face; yet our scenario could be further compounded by acute economies of scale. The report states:

> *New technologies for the design sector are constantly becoming available in the market. However, many of these tools are imported and costly, and are therefore used only occasionally by a small group of Brazilian designers. (2014, p.82)*

[8] Centro Brasil Design (CDB) - http://www.cbd.org.br/

7.2 Business Issue

Contemporary buzzwords such as 'Ideation', 'Incubator', 'Innovation', and the touting of business models and marketing plans are ubiquitous in many local institutions. While this is promising of progress being made, the information generally sourced is focused on conducting 'business'. Additionally, some institutions established to promote training are steeped in historical turf with mandates that could be decades old. The old adage that, "You can only teach what you know," comes to mind. Collectively they may be failing to address greater investment in alternative areas, particularly industrial design, that require growth. Therefore diversification of content or services offered by the said institutions needs to be examined, but in order for that to occur they must be willing to collaborate fully with political and community leaders, educators, designers and the public at large, on how best to execute new mandates or policies, that will stimulate all sectors.

Table 1 An objective list of key players and policy makers who bridge the gap from college graduate to savvy entrepreneur.

Barbados Coalition of Service Industries (BCSI)	Barbados Youth Business Trust (BYBT)
Barbados Cultural Industries Development Authority (BCIDA)	Enterprise Growth Fund (EGF)
Barbados Entrepreneurship Foundation (BEF)	Fund Access (FA)
Barbados Investment & Development Corporation (BIDC)	Ministry of Community Development & Culture
Barbados Manufacturers' Association (BMA)	Ten Habitat
Barbados National Standards Institute (BNSI)	Uni. of the West Indies (UWI) - Cavehill School of Business
Barbados Small Business Association (BSBA)	Youth Entrepreneurship Scheme (YES)

The contribution of the Barbados Investment Development Corporation (BIDC) has been significant. In 1991, two statutory institutions, the Export Promotion Corporation (EPC), and the Industrial Development Corporation (IDC), the latter having a design arm, were subsumed to form the BIDC. Funded by the European Union (EU) under the BIDC, the 'Design Centre' was formed, with the objective to provide direct assistance in the area of design to manufacturers and businesses, and to advise government and its agencies on the matter of design. A design department is also a part of the corporation. It was critical for the BIDC to train professionals, provide workshops and seminars on the importance of design. Their mandate has been pivotal in developing export capacity, and they have facilitated training on the value of design to Small to Medium enterprises (SME's), along with design service delivery. With regards to design policy and standards, there may be a grey area with documentation. An 'on the verge of' policy document entitled *'Understanding Product Development'* was drafted twenty years ago. The BIDC offers many services to the community at large, but these are somewhat fragmented or snippet-like in character. We can deduce that within the BIDC, there is a need for common ground, which addresses the needs of design, manufacture, and the business industry.

7.3 Social Issue

On the notion of cultural ideology, we summarised in the case studies that there is a culture of 'DIY', which needs to be examined. Many simply did not ask enough questions or researched who could assist them in their ventures. There is also the notion of the post-colonial glass ceiling which is explained, in the following quotation. In essence many abandoned their projects seeking job security, which by most local standards is an ideal source of comfort. Nettleford remarks on psychological trappings:

> *The paradox of Caribbean life is that the more things change the more they have remained the same. The vault-like ascent by the society from slavery into freedom and then from colonialism into constitutional independence is yet to be matched within the society by a corresponding progress from cultural inferiority of the vast majority to cultural self-confidence. (1979, p.3)*

The majority of graduates come from lower middle to middle-income households where there is no pressure to leave the nest. This is a common lifestyle found in the Caribbean. Students and

graduates alike need to recognise these trappings of 'doing enough or just settling' and that they can achieve more than they are led to believe, recognising that in fact, they are the masters of their own development.
To summarise, prototyping is exorbitant and in some cases the aforementioned cannot be constructed locally. Some key players may need to revisit their mandates and look to diversify the training and practice, particularly in the field of design, and look more to the benefits of design, which stimulates innovation within their companies. Island wide, socio-cultural challenges persist and it is imperative to acknowledge its presence and have a discourse on how best to tackle the issue.

8 Recommendations

Based on the case studies, a new environment needs to be fostered to cultivate more culturally enriched ideas whether from a localised or international perspective. From a historical perspective the interdisciplinary subjects undertaken on our BFA programme i.e. illustration, web design etc. must remain, but with a new paradigm. Students will need to develop a wider range of skills as the solutions developed encompass areas such as design and innovation, business studies and other variables. Intrinsically, they must learn how to collaborate with other practitioners in a variety of fields. The graphic design department's introduction of the business model and basic accounting through BYBT, though in its infancy, means that more time must pass before we can truly assess that it is successful. In the meantime, consideration to move towards the inclusion of learning about profit through an economic model system is feasible i.e. A 'Project Level' model introducing components such as development expense, unit cost, product performance, schedule, sales and distribution. The utilisation of a simple economic model will allow the student to make better decisions by quantifying rather than playing guesswork. The intersection of principles of business, industrial design and its management, and marketing are resounding.
We must be mindful of maintaining the balance of research and graphic design, as we are lead to believe, that they are interested foremost in their principal vocation. Moreover, the theory and practice of design thinking and user experience needs to be applied as a module to the programme. This can help shape the students' outlook on the human centred facet of what they do and in particular, this training will be highly fruitful, to those who feel a greater affinity to notions of industrial design and product development.
The benefit of a prototype facility can be highly substantial. For the purposes of the remainder of this paper, the facility shall be called the 'Kick Start Prototype Facility'. 'Kick Start' may be developed as a **'start up'** serving the needs of students and graduates to test the feasibility of products before considering going to market.
If we look at the fully equipped 'Product Support' facility of the Craft & Design Institute[9] (CDI) in South Africa, we can create a similar blueprint, but edited to lessen the issue of underutilisation. 'Kick Start' will be able to serve the arms of other educational institutions such as the University of the West Indies (UWI). Hypothetically speaking, student and graduate products initially developed under the tutelage from both the BCC and the UWI, can reside in the same space. Perhaps both institutions find intriguing yet complimentary patterns in subject matter, thereby allowing the construction of better solutions for products leading to business partnerships. This can be a starting point, serving to eradicate the DIY mentality, therefore fostering mutual benefit through collaboration. Continuing on an all-encompassing path, there is no reason for persons from any socio-economic strata, untrained in the field of design, from using 'Kick Start'. One certainly doesn't need a university degree to have a great idea for testing. If the approach to testing and measuring is made accessible to all, better structures on serving the community can be built even though it may be conceived through trial and error.
Contents of the 'Kick Start' prototype facility can be as simple as:

[9] http://www.thecdi.org.za/?page=equipment_tools

- laser cutting machine
- three-dimensional printer for rapid prototyping
- sewing machine
- heat machine for bending wood
- large format printers
- metalwork and woodwork stations
- video cameras and digital cameras for recording tests
- assorted hand tools – traditional, electronic and digital

All supervised by technicians and advisors, the aforementioned are great assets for productivity. Ultimately Barbados is not set up for creative experiments and the importing and outsourcing of many products and services could be significantly reduced.
There is absolutely no doubt that there are organisations that can assist with business development and entrepreneurship. Placed under scrutiny, many key players have overlaps in their services. If mandates are diversified to include design and the benefit of design to the SMEs they normally target, they can evolve more readily with global trends in business and adjunct sectors. The amalgamation of some of the functions could result in the consolidation of funds, and services could be diverted accordingly, for a more effective facility.
Secondly, there is no Design Institute to actively facilitate policies, standards, support in design education and spread the goodness of design to the community at large. To reiterate, the BIDC is the closest entity encouraging and promoting the benefits of design, but the majority of the time is spent on working with SMEs and designing material for those entities.
For the remainder of the paper, this proposed institute will be called the 'FutrLux Design Institute' (FDI). The FDI is a subsidised space where shareholders partner with the Government to shape policies and standards for Barbadian products, (with heavy emphasis on the design agenda), so that the latter can flourish locally, regionally and internationally. FDI works in partnership with 'Kick Start', helping either student or graduate and any other shareholder, see their design to fruition. The 'FutrLux Design Institute' functions to:

- promote and exercise design as an enabler of innovation in a multi-sector landscape
- set design education best practices
- train design teachers in design thinking
- modernise design curriculum in educational institutions
- devise campaigns with government to promote the value of design to the wider public
- utilise design methods to shape policy development
- develop the export capacity of all design disciplines
- collect historical data on design works produced locally
- develop design exhibitions
- research how the public and private sectors use design
- establish a bi-annual conference and the publishing of papers in design circles
- host workshops fostering professional development
- organise design competitions through schools as well as in the professional arena
- encourage the appointment of design managers to work in private and public sector departments
- establish mentorship programmes with students and recent graduates
- examine international standards and correlate in the context of Barbados
- gather data on the country's Gross Domestic Product (GDP) in relation to design growth.
-

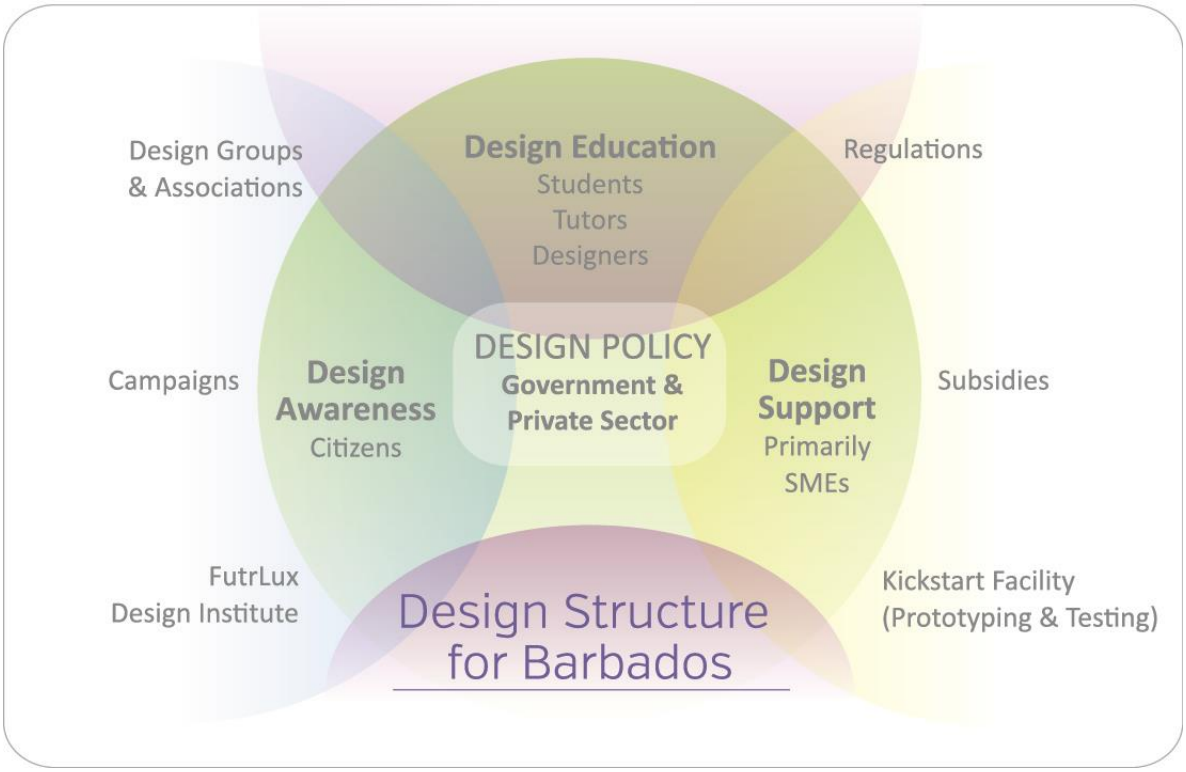

Figure 7: A proposed system for the future of design in Barbados.

But firstly, a discussion with all stakeholders needs to take place on how best to tailor FDI based on the needs of the country. In 2015, the Visual Arts Department at the UWI in the Republic of Trinidad and Tobago established a colloquium seeing the urgency of having a Ministry of Design, and they continue to campaign for its emergence. Compared to some of our developing nation counterparts, we have fallen behind on achieving this type of reform.[10] Amir informs us of three developing nations that looked to expand their product competitiveness:

> *In India, design policy is implemented through the establishment of the National Institute of Design, which puts an emphasis on educating designers and serving industry. In Colombia, there exists Artesanías de Colombia, while in Cuba there is an Oficina Nacional de Diseño Industrial (National Office of Industrial Design) (2004, p. 71)*

To summarise, the benefits of having the 'Kick Start' facility and the 'FutrLux Design Institute' can change the course of economic growth by the act of diversification. Small steps must be taken to analyse the needs of not only the students, but the citizens of Barbados thereby creating what is suitable, yet dynamic in approach.

9 Conclusion

The old and restrictive paradigm, within which we reside, can no longer exist in light of so many available and emergent technologies. Educators and designers must work in unison to form a new model in order for design education to evolve. It is evident that whatever we tackle must be an on-going process, as it is relatively unknown territory on which we tread. The design student must be prepared to work in various capacities, straddling new technologies in design, business, manufacture, human and social sciences. If we agree that necessity is the mother of invention, then it can be said that the 'Kick Start' prototype facility working in tandem with the 'FutrLux Design Institute', can create an alternative path for growth in the creative sector. The elephant sleeping in the room continues to be the post-colonial glass ceiling; a ceiling that affects political and community leaders, educators, parents, and children. This micro study of five participants which

[10] Sourced online from the World Design Organisation (WDO) under 'Community'. www.wdo.org

represents a microcosm of the society, has revealed that those who feel more secure financially are comfortable maintaining the status quo, i.e. stable job, a house with picket fence mentality, while those who feel financially insecure express a need for more time and income to invest in their product.

For those who lack the initiative to see the product through to market readiness, three solutions are suggested. They include grant funding where the student develops the idea in a supportive environment. Secondly, sell the concept to a venture capitalist i.e. purchase the patent outright, or negotiate a deal for use of the patent and pay the student royalties. Lastly, provide the opportunity for partnership, where the student bares none of the expenses, nor the responsibilities of administration, but is however allowed to direct or manage the product's creation.

Ultimately the driver is expansion. If national leaders from both the public and private sectors create options, Barbados can grow. Building a design sector drives the economy making for a richer Barbados ethically, socially, financially and politically. Critical building blocks are attributes, such as heritage, legacies, and fostering an environment towards equal footing on a global platform. We must begin this process of capturing the student's product ideas well before graduating so that they have a better foundation from the powers that be, on the infrastructure of 'design, business and manufacture'.

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Puerto Rico 2054: design pedagogy in a time of crisis

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This article describes the conversation and process between two Caribbean design educators, one from Puerto Rico, and one from Trinidad and Tobago, as they co-developed an appropriate design class for students who were experiencing a catastrophic event. The curriculum built on a design curriculum, developed by the latter for children in a rural village in the English-speaking Caribbean that focussed on promoting equity and empowerment through reflections and critical discussions by the participants. The curriculum was adapted by the former, using her resilience thinking toolbox with her undergraduate students in Puerto Rico in the wake of Hurricane María. The aim of the curriculum was to help the Puerto Rican communication design students move beyond merely coping with the impact of the natural disaster, to action and thriving through design. Students were led through several design stages that included reflections, critical discussions, brainstorming around future utopian or dystopian scenarios and proposing solutions. The students were expected to focus on a Puerto Rico in the year 2054 as a strategy of resistance visualization. In this paper, the authors describe the four phases of implementation of the curriculum, as well as the reflections of the students and their own reflections on the collaborative process and its significance.

design pedagogy, design fiction, design for hope, Puerto Rico, Caribbean design

Opening vignette

It has been 3 days since I've been trying to send you an email. I decided to send a text message instead.

Classes start on Tuesday, with students who have lost their homes. The material doesn't make sense anymore in the current circumstances… there is no electricity, no Internet…

How can we teach design in a way that makes sense now?

SMS from Mari Mater O'Neill to Lesley-Ann Noel, October 15, 2017

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This was the call for help from my Puerto Rican colleague. Her question was a valid one, how do you continue design classes as normal in the wake of natural disaster that has erased all the familiar indicators of normal life for the students? Our design curricula often focus on designing objects, communication, and systems. We are driven 'to improve' everything, but what do we do when everything is gone?

Noel's reflections on receiving O'Neill's message

I thought maybe how we taught design in the 80s way … no tech … almost crafts... and do actual things their community needs … I'm a bit lost

O'Neil, October 15, 2017

I promised to send her some ideas for her class. I had been working on a design curriculum that did not focus on objects, but was developed to promote critical discussions and action through design, as a form of empowerment in a rural community, thereby using design as a form of critical pedagogy, and to change the narrative from despair to hope. Maybe there was an opportunity to use this approach in Puerto Rico as well.

Noel's reflections

1 Introduction

Hurricane María, barrelled into the island of Puerto Rico, as a category 5 storm on September 20, 2017. The destruction in Puerto Rico was catastrophic as it wiped out energy power, built infrastructure such as concrete houses, hospitals, cell phone towers, as well as other basic infrastructure such as roads, water utilities and bridges. The Federal Emergency Management Agency (FEMA) categorized it as the worst disaster in the United States (Metro PR, 2017).

Classes in the design program at a university in eastern Puerto Rico restarted as scheduled on Tuesday October 17th, 2017, almost a month after the destruction of Hurricane María, and amidst the efforts of families to reconstruct their lives. As at many universities on the island, there was no clear guidance on how to approach educational objectives in light of the hurricane and its persistent impact on the population. This article is about the process between two Caribbean design educators, one from Puerto Rico, and one from Trinidad and Tobago, to co-develop an appropriate curriculum for the students after the disaster, and on the implementation of this curriculum at a private university in the eastern rural coastal town, near to where Hurricane María hit land.

1.1 About the university, programme and original content

The program that hosted this course, where María de Mater O'Neill is an adjunct professor, is a new undergraduate programme in Graphic Design and Multimedia at a private university in a small coastal town of Puerto Rico. The design courses that were modified and are described in this paper were originally on ethics and law; business for graphic designers; and senior digital portfolio. In a typical semester, in the ethics and law course the students would have read weekly on specific themes and responded to five questions, posting their responses on an online blog. The other half of the semester the students would have prepared a small academic report about a non-designer who had designed something innovative in their community. This would have been their first attempt at research and academic writing in the program, which is more focused on the production of artefacts. The students also would have had the opportunity to create seven one-page illustrated stories based on the class themes, which included ethics, law, and accessibility among others.

In the second course, the students also would have learned about design management, where they would have worked with a real client. Through this interaction, and with O'Neill's guidance, they would have learned about contracts, budgeting and other aspects of running a design business. In the last course, as part of their senior portfolio, students would have developed their portfolios online.

Post-Hurricane María, much had changed on the island. Internet was non-existent in the students' homes and it was inconsistent on the university campus. Power in the town now came from diesel generators. Business in this town, as in much of Puerto Rico had been seriously impacted by the lack of power. The university campus was not significantly affected by the storm, except for the impact on electricity. In the town, however, the effects of the storm were more visible, for example by the long lines for food at the Salvation Army and for benefits at the unemployment office. At the time of the writing of this article the graphic design program had lost approximately fifteen per cent of its students who had decided to migrate to the mainland.

1.2 About the students

The eleven students in the class were smart, eager, and curious about the world. They were around their early twenties. Some, like Ana[**] had only just visited the capital San Juan for the first time. All but one was from rural Eastern Puerto Rico. Most, like Tonio, were dark-skinned and lower middle class. Some of them had low-paying jobs. Education was their only chance to get ahead. They knew they needed access to better opportunities. They knew they lived in isolated communities, and felt even more isolated with the lack of Internet access after the hurricane. Some students had lost their laptops, while one, Luis, had lost his house. The major hotel in the town had closed after the storm, and therefore students and their parents who had jobs at this hotel were now out of work. One student, Sami, started the course, but went to the mainland during the semester and was unable to return to Puerto Rico due to flight restrictions.

1.3 About the educators and methodology

Mari de Mater O'Neill, is an adjunct educator in a Graphic Design and Multimedia Program at a private university in Puerto Rico. She also has a design studio that was also negatively affected by the passage of Hurricane María. In light of the impact of the storm on the students, and in the absence of guidance from the university, O'Neill decided to modify the content of the curriculum of the three courses, in order to provide a more situated and relevant context for learning. She reached out to her colleague from a university in Trinidad and Tobago, for suggestions on creating a curriculum around hope and resilience.

Lesley-Ann Noel is a design lecturer at a Visual Arts programme at a university in Trinidad and Tobago. She developed a design-based curriculum for empowering education for children at a rural primary school in Trinidad. The curriculum focused on the themes of equity and empowerment. Her method employed student reflections and journaling, critical discussions and action through design. The curriculum was developed around the principles of Critical Utopian Action (CUAR) and Shor's (1992) framework for empowering education. CUAR adds critical theory and the vision of a sustainable democratic lifestyle to action research. Its framework connects critiques to utopian ideas and action (Husted & Tofteng, 2015) with local stakeholders (Nutti, 2016) around critical questions such as '*what's wrong*', and questions that lead to utopian action such as '*where do we want to go*' and '*how can our dreams become a reality*?'. Shor (1992) proposed a framework for empowering education that encouraged students to become thinking citizens, change agents and social critics. He proposed that empowering pedagogy must be participatory, affective, problem-posing, situated, multicultural, dialogic, desocializing, democratic, researching, interdisciplinary and activist. Noel built on these concepts in her elementary design curriculum as well as in the suggestions that she made for O'Neill's post-Hurricane María class. In this approach, she proposed that the discussion and reflection during the design process are significant in the development of solutions to local problems.

[*] N.B.: The names of the students have been replaced with pseudonyms to protect their identities.

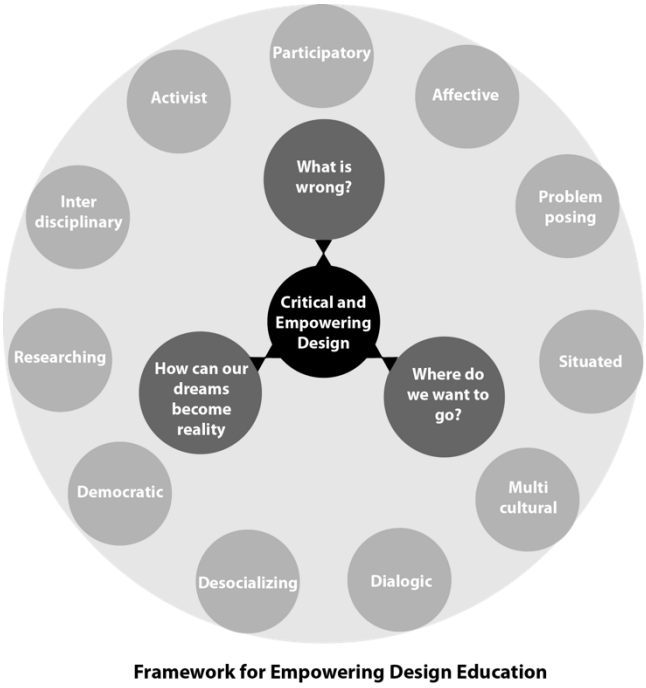

Figure 1. Empowering design education framework proposed by Noel. Source: Noel

O'Neill adapted Noel's curriculum and included her (O'Neill's) 9 step toolkit (O'Neill, 2014) which had the aim of developing resilience thinking in designer-practitioners. The toolkit first helps the user to focus on their objectives and then to develop skills for strategies during stressful circumstances. She focused on inequality, social dominance theory and climate change (Sidanius and Pratto, 1993a) since Puerto Rico, a United States non-incorporated territory but with American citizens, was suffering from economical disarray before the hurricane.

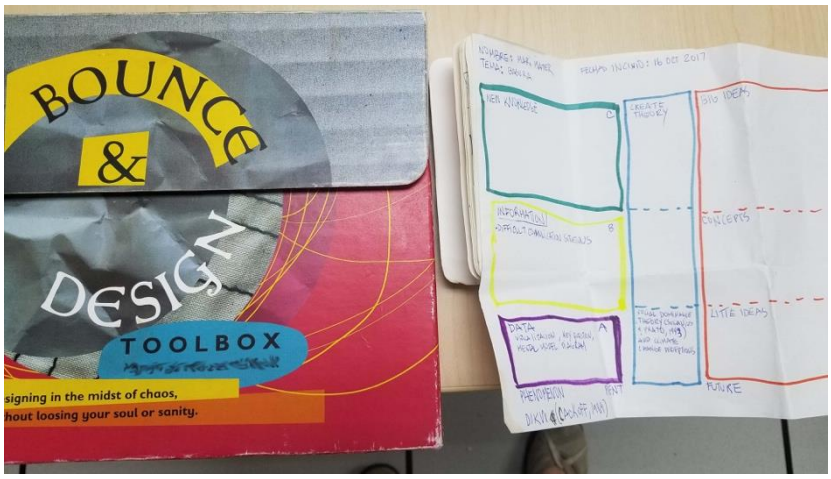

Figure 2. Resilience toolkit designed by O'Neill, alongside a planning diagram from a student's journal. Source: O'Neill.

2 Description of the revised curriculum

The aim of the revised 'Post-María' curriculum was to provide a platform for students to share and build on the experience of the crises of Hurricane María, and loss of their homes and displacement, and to create a forum for hope and action in the design studio, while students collectively dealt with their loss and grief. Curriculum should be developed around outcomes (Wiggins and Mc Tighe, 2005), and the desired outcomes for this course were a) the cathartic discussions and reflections of the students and b) design activity where students developed and proposed solutions to some of the challenges that they had identified, using design theory and theoretical concepts such as critical utopian action research and design fiction.

The project was called 'PR 2054', and this was a reference to '*Minority Report*', a 2002 film by Stephen Spielberg that starred Tom Cruise and was set in 2054. Bleecker (2009) referred to this film as an example of 'design fiction' and how stories could be used to develop design ideas for the future. In this project the students were challenged to develop future scenarios of Puerto Rico in 2054, and to develop solutions for problems that they identified through critical discussions and reflections.

The course outline was divided into four parts as follows:

- Understanding what happened
- Thinking about Utopia
- Making in times of catharsis
- Reflection and critique

In the following sections, a detailed description is provided of what took place in the 'Understanding what happened' part of the project.

2.1 A. Understanding what happened

2.1.1 Plan

The aim of this section of the curriculum was for students to share their experiences and reflect critically on what had happened through storytelling, journal reflections and group and individual analysis of the past, present and future of Puerto Rico.

The activities in this part of the course included discussions, reflections, journaling, drawings, mental models, prototyping and interviews. The rationale for these activities was that discussing the 'catastrophic event' would help students with the grieving process, and could help them with 'coping', through an emotional experience process. They would also have the opportunity to discuss positive outcomes, humorous anecdotes, stories of resilience etc.

The questions that guided this activity were:

- What has changed?
- Where are the 'struggles' or challenges of people since the event?

At the end of this phase, students would then focus on one problem they would work on for the rest of the study.

2.1.2 In the field

Students were already familiar with design thinking and user centred methodologies from their project-based experiences with O'Neill. In the implementation of the curriculum, O'Neill also did the same tasks that she requested of the students as her own way of responding to the crisis. This made the class more participatory since, as a participant, the hierarchy of her position as teacher was removed. The anticipated result at the end of the semester was a selection of usable prototypes that addressed problems in their community. In the project, the concept of community was defined as the people with whom the students commune with such as their friends, family, and people who live on their street, among others. The final prototypes did not have to be fully functional, and could in fact be conceptual proposals that responded with to the needs of users. Noel suggested that the problems should not be restricted to the realm of communication design, so that the students could develop solutions to any type of problem that they felt the need to address.

Before starting, the students were given the opportunity to choose to follow the original syllabus or to pursue the new revised curriculum. They were also aware that they would be the subjects of the study for this article. Others professors were also invited to use the same approach. One accepted but his students chose not to participate.

Figure 3. This was Luisa's response to the sketch challenge as a response to the problem that she had identified: Apagado (turned off). Source: O'Neill

Since some of the students had lost their laptops, journals were used as a research tool to document thoughts and evidence of completion of academic tasks. The projects and supporting presentations were done by hand and without the use of technology. Evaluation was done based on the content of the journals. A wall in the classroom was assigned as a "project wall", where every week all the journal tasks were copied and displayed for analysis and open discussions. Other members of the academic community were also able to view this wall. Project photographs and audio of the students' reflections were uploaded weekly to cloud-based storage, so that Noel, who was not in Puerto Rico, could access them and follow the projects.

Communication during the project was very difficult. O'Neill and Noel tried to communicate weekly via text messages, and email. This was affected by the damage to communication infrastructure that was subjected to 200mph winds during Hurricane María. O'Neill was forced to upload work from the side of the highway wherever she could get a good Internet signal.

Figure 4. These cards are part of the resilience toolkit that some students used to help them focus on the tasks. On the left is Luisa's selection and on the right is Tonio's. The cards helped the students to visualize their decision process and their mindset during the project. Luisa was more focused on the main plan (results) and Tonio was more focused on solving problems at hand. Source: O'Neill

After the first week, the students asked the two main questions, 'what has changed?' and 'where are the struggles or challenges of people since the event?' to the community that they had chosen to work with.

The following themes were identified in the responses to the questions:

1. *Inside and outside of the catastrophe* – where some people seemed to live in a bubble because very little had happened to them when compared to people whose lives had been devastated within the same community. Gabriel, who identified this theme was working with his own community
2. *Apagado* (turned off) – where some people had a lack of energy and emotional engagement to confront coping with the disaster. Luisa, who identified this theme, was working with a community in a nearby town, Humacao, and also with a close friend who had lost everything. She also used the resilience toolkit as she said it helped her to focus. (Fig.4).
3. *Survival mode* – Where people accepted any job as a response to the massive rise in unemployment. Luis, who explored this theme, was working with people who lived on his street.
4. *Mobility* – People lacked access to places since roads were blocked, and bridges had collapsed. Post-María it took a very long time to travel from one place to another. Tonio was working with a relative who has a farm. He was also using the resilience toolkit to support his research. (Fig.4).
5. *Emotional regulator* – where people had to learn how to be stoic and level headed. Ana worked with her family as her community. A family member who had maintained calmness and strength despite the stresses of the situation had inspired her. She also used the resilience toolkit as part of her process.
6. *One day at a time* - The act of planning under these circumstances had become impossible. Josefina, who was researching this theme, was focusing on her own family.
7. *Reusing resources* – Trees were denuded and uprooted in the storm, and they are being discarded and not used. Greta proposed this theme.
8. *Garbage* – Although the garbage continued to be generated, garbage collection and recycling services have stopped. The professor, O'Neill, who also took part in the brainstorming and prototyping activities, proposed this theme.

After the identification of problems and themes, students were asked to create sketches about their selected theme. Emphasis was placed on imagination and not to trying to solve any problem. This gave them a chance to reflect on their feelings.

Students were required to document their own journeys and this evolved into an activity around creating a diagram for a mental model (Young, 2008). They had to record the objectives of the day and the steps to achieve them (Fig.5). The mental model tool is a visual diagram detailed summaries of a person's tasks and the steps to achieve them are recorded. This information is then organized into categories such as type of task, beliefs, and emotions, among others. The purpose of this activity was to identify behavioural patterns. Students recorded their daily tasks for a week, ensuring that they included new hurricane-related routines. By the end of this activity it became very clear how the hurricane had impacted their everyday routines. The students were also able to categorize the type of impacts on their routines. The top part of the mental model represents the daily objectives and bottom part represents the steps to achieve them. They categorized their actions by colour code. In the following diagram, the disruption that the hurricane caused is evident. The green represents their pre-hurricane routines, while orange represents the modifications to their routines that took place after the hurricane. The new routines in orange overwhelmed the traditional routines in green demonstrating the disruption that the hurricane caused in the image below.

Figure 5. Ana's mental model diagram, where for a week she recorded her daily tasks and the steps to achieve them. The purpose of this activity was to pick up behavioural patterns and quantify the impact of the hurricane on her everyday life. The 33 green boxes are her usual routines and the 40 orange ones are the new routines related to Hurricane María. Source: O'Neill

2.2 Thinking about Utopia

2.2.1 Plan

The second phase of the project entailed imagining a new future for Puerto Rico in 2054. The students could use themes such as humour, optimism and utopia, as well as pessimism and dystopia to guide their discussions. The activities in this phase included brainstorming and the development of design proposals and rapid prototypes as a response to their discussions and reflections on present-day problems. The proposals could have been fantastical and did not have to be grounded in reality or the possibilities of technology or existing resources. The activity of proposing solutions put students 'in control' of the situation, and put them in an active role that could lead to change. The students also had to document their own feelings about being able to propose solutions that lead to action and change. The guiding scenario for this phase was:

- We have been given the opportunity to change everything about a problem, what new solutions can we propose? What would the solution to the problem look like in Puerto Rico 2054?

The desired outcomes of this phase were the design proposals of the students.

Figure 6 A rapid prototype for a future scenario, developed as part of the 'Thinking about Utopia' phase of the process, in which students created products without restrictions. This is a flying power generator for the community. source O'Neill

2.2.2 In the field

Though they could have chosen utopia or dystopia, students chose to envision a Utopian Puerto Rico, and all but one future scenario described a Puerto Rico with a better future and better prepared for natural disasters. Though the students were communication design students, the problems were more complex and 'wicked' and therefore the conceptual design solutions that were proposed moved beyond signs and symbols and were higher order design solutions, such as products, interactions and systems, using Buchanan's scale of four orders of design (Buchanan, 2001). The professor also participated in this process alongside the students by doing her own brainstorming and developing her own concepts. This was done to remove the teacher-student hierarchy, and to encourage the students to embrace the idea of proposing many different types of ideas, including absurd or ridiculous concepts.

The rapid conceptual prototypes were completed within a 3-hour time span and were made with found materials. Only one student did not finish.

The conceptual design solutions for Puerto Rico in 2054 are described in the table 1.

Table 1 Description of the conceptual design solutions proposed by the students.

Theme	Design Solution	Description of the solution
Inside and outside of the catastrophe	Flying Power Generator-	This generator would be located underground. When the need arises, the street would open, and the generator would fly out and fly to wherever it was needed.
Apagados	Solar Smartphone-	This project would facilitate communication, which is needed. It would operate on solar power and emotional energy.
Survival Mode	Portable Laser Cutter	This solar powered tool would be used to cut trees and other materials. It would allow people to do odd jobs in the community.
Mobility	Smart Bridges	This bridge would be made with recycled materials. It would sense when the water was rising and the bridge would open to let the water pass it would also notify the community of the rising waters.
Emotional stability	Solar Refrigerator	This refrigerator would operate on batteries charged with solar power. It would be stocked with comfort food.
Reusing Resources (trees).	Change of Perspectives Glasses	With these glasses, the user would look at fallen trees with a different perspective so they could see other possibilities for use.
Theme- unidentified	Medical Cyborg-	This medical device would be used for monitoring patients that were trapped in their community via satellite. Patients would have nano technology inserted into their bodies.
Garbage	T2TP (Plastic Trump Transporter)	This invention would scan plastic in the 2054 future, and send it back to Trump in the 2017 past in the form of flatulence.

2.3 Part c: Making in times of crisis – cathartic experience

In this third phase of the course, the students made more functional prototypes both individually and collaboratively. Making is a challenging and focused activity, and a necessary part of the design process. Students made the final mock-ups of their solution using found objects. The user needed to know how to use it and what it was for on their own, without instructions from the designers. This would demonstrate a high level of affordances in terms of design considerations and the clarity of purpose of the designs.

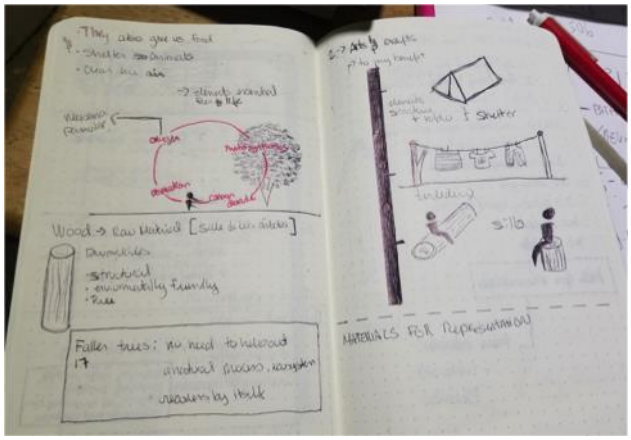

Figure 7 Greta's journal, drawing for final prototype. She reflected on trees, their importance, and how they had been discarded after the hurricane as a way to develop a design for a final usable prototype. Students used their journals to document their thoughts. They also participated in group discussions and conducted small user tests with their usable prototypes with individuals of their chosen community. Source O'Neill

Students got feedback from their peers on the solutions. For designing the final prototype, the students were assigned the task of using a DIKW diagram (Data, Information, Knowledge, and Wisdom) diagram and O'Neill's set of cards with key question for disruptive business development were used.

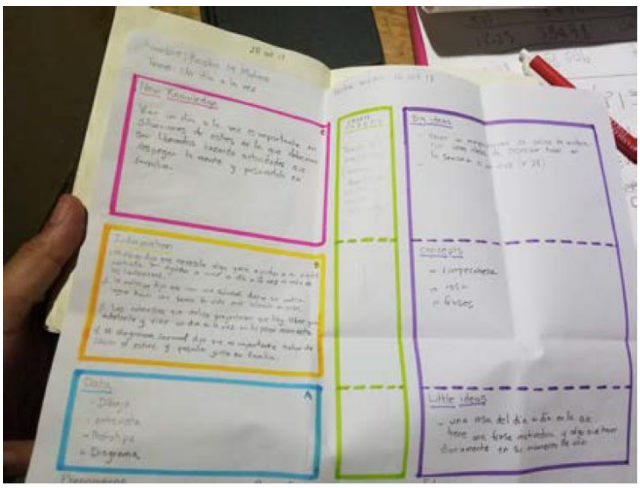

Figure 8 Josefina's DIKW diagram was used at the end of all the activities, so she could design a usable prototype for the final project. The DATA blue box (lower left corner) is the list of the curriculum tools: sketches, interviews, 2054 Prototype, and mental model diagram The YELLOW Information box represents the findings of each tool, the top left MAGENTA box is the new knowledge acquired by each tool. GREEN middle rectangle are theories the students based on and the right PURPLE box, are the actionable ideas. Source: O'Neill

For this stage first, they used the DIKW (Data, Information, Knowledge, and Wisdom) diagram (Ackoff, 1989, cited in Sanders and Staffers, 2014, p. 200.), so they could understand the analysis skills needed for design led research (Fig.8). The DIKW diagram helped the students understand how to transform data into information, information into new knowledge and finally into insights, so new knowledge becomes "actionable". This would help them generate ideas for design solutions for the final usable prototype. The new knowledge acquired by the different activities done in the new curriculum made "the transformation of information into instructions" possible (Ackoff, 1989, p. 4).

Figure 9. Set of cards with 5 key questions based on Luke Williams's system of crafting disruptive hypothesis. Source: O'Neill

Secondly, they used O'Neill's disruptive cards, with five key questions to help them think about innovative ways to interact, sell, among other things, concerning new products or services. The purpose of this step was to write a disruptive hypothesis by discarding clichés or standard beliefs that dictate the way people think about a particular user experience. These 5 cards are based on Professor Williams' system of crafting a disruptive hypothesis: "an intentionally unreasonable statement that gets your thinking flowing in a different direction […] Contrast this with the more traditional definition of 'hypothesis,' which is a best-guess explanation that's based on a set of facts and can be tested by further investigation." (Williams, 2011)

Students were required to be reflexive throughout the design process. They used journals to document their thoughts. They also participated in group discussions and conducted small user tests with their usable prototypes with individuals of their chosen community.

Figure 10. Greta's final project was a model-making toolkit to help users imagine new possibilities for fallen trees.

2.4 Part D – Final Projects, reflections and critiques

After developing the future-focused concepts, the students focused on developing usable prototypes. These prototypes could differ from the conceptual ideas which they presented in the third phase. From eleven students, seven were able to finish their prototypes, do the user test, and present the results to a guest judge. The guest was briefed about the course and the expected results but not on the specific student proposals. The students made presentations to the guest as a form of practice for their professional lives. The best prototypes are described in the following table.

Table 2 Descriptions of the best final projects.

Theme	Description
In and out of catastrophe	A hanging sign that users can place on their front door that would let other members of the community know what they needed such as medicines, gasoline, diesel or batteries, and water.
Apagados (turned off),	A set of card games to strengthen social relationships, logistics skills and self-reflection (Fig.11).
Emotional regulator	A folding poster for families with a list of hurricane preparedness tasks. (Fig. 13)
One day at a time	A toolkit with a puzzle and simple daily tasks to strengthen self-motivation (Fig. 12).
Reusing resources	A model-making toolkit to help users imagine new possibilities for fallen trees. (Fig. 10)

Figure 11. Apagados card game strengthens social relationships, logistics skills and self-reflection. source: O'Neill

This course took place over a period of eight weeks, and the students met with their professor once a week for three hours. At the end, students indicated that they enjoyed the course, and that they thought it was a good educational strategy because it made sense in their post-disaster context.

Key themes that were identified in the reflections of the students were related to their appreciation of the authentic learning context. Resilience was a significant theme and was seen in the way the students used the research process as part of their own healing and resourcefulness. It was also seen in the way the students adapted to the context to use what was available to develop solutions. These themes were seen in the words of some of the students.

Reflections from students

It is not as before, doing research to try to understand the context, this is different because I am living it. I explained to other people that are not in this situation but they still do not comprehend (…) psychologically it has helped me, to step back, take a breath, organized myself and see things from the perspective of the design practice. [It also] helps me focus on the profession I am studying.

Ana

I find it very challenging and it's a good experience, … you read about other research but this time I am the research, we are the research. Therefore it changes our work perspective and it will show on the prototypes. It is a very profound experience to work this way.

Gabriel

It also helps if in the future one has to work with a similar problem I feel I can be empathetic and comprehend the context" [concerning the resilience tools] "the tools made me realize that I am organized oriented and use very fast the resources that I have available (…) the tools has visualized to me that despite been in a catastrophic situation I have maintained focus.

Luisa

Figure 12. "One day at a time" toolkit with a puzzle and simple daily tasks to strengthen self- motivation. Source O'Neill.

2.5 Reflections of the collaborating educators

I think that as a national collective we are going through some level of what psychologists refer to as trauma adjustment. I was away on a hiking trip in Spain when the hurricane hit. I left a 2017 Puerto Rico and came back to a 1950s Puerto Rico, with a style of living that didn't have the infrastructure to support it any longer. The geographical reality of being an island became less attractive and more scary. Reaching out to a fellow colleague that came from the Caribbean was a form of help from the

outside, but not from an outsider. The technical challenges of communicating, uploading files and even co writing the article gave me a structure to try to order and make sense as a design practitioner and educator of the everyday anarchy. It is hard at this point to see results in the students, except I have noticed a sense of purpose, improvement in their verbal articulation, and an increase in their locus of control. This curriculum is not for everyday teaching. I wonder how it could be adapted in places that there is no catastrophe or another type of national stressor. I don't know if it can be replicated without these circumstances. But it something to explorer if we want to prepare future practitioners to work for more humanitarian needs.

O'Neill's reflections on the collaboration with Noel

The 2017 hurricane season was terrible for the Caribbean region. Several islands such as Barbuda, The British and US Virgin Islands, St. Maarten, Dominica, and Puerto Rico were significantly impacted by the hurricanes Irma and María, with much of the local infrastructure being wiped out. As each island was hit, I combed through my friends' social media accounts and sent SMS messages to make sure they were okay. Waiting on responses was harrowing. Even though I had not been affected directly, I, like many in the region, experienced significant psychological trauma as we followed what had happened to our loved ones on other islands. Puerto Rico is part of the United States, but their experience is often closer to ours as former colonies in the Caribbean, than to that of people on the mainland. Sadly many Puerto Ricans have left and migrated to the mainland, many of my Caribbean neighbours do not have that opportunity and have to stay on their destroyed islands. What will happen to the region though, if its citizens walk away from destruction?

I contacted Mari, like I had contacted many of my other friends, and was glad to know that she had escaped the storm. When she reached out to me for advice on the curriculum after the storm, I felt that it was a tiny way that I could support a colleague, and hopefully we could develop a model for localizing and contextualizing a curriculum.

It has been a difficult collaboration and it brought home the challenges of life in post-María Puerto Rico. Mari and I always communicate in a type of 'Spanglish', but communication for this collaboration was so much more complicated. We communicated via SMS and email and used cloud storage to share files, but sometimes we would have to wait one week for a reply due to poor Internet service in Puerto Rico. It was a very 'analogue' process. Mari's question about 'How can we teach design in a way that makes sense now?' is a question that I have reflected on for several years, even without a catastrophe like Hurricane María as a backdrop.

Design practice in many developing countries resembles but is very different to practice in Europe and North America, despite this so much of our curriculum is so strongly influenced by the Bauhaus or other external sources, without significant variation for the local context, and challenges of daily life in our regions. It is too early to assess the 'success' of these projects, but hopefully, the process has been able to help students cope with the reality of a post-María existence, and to envision a future for Puerto Rico in 2054.

Noel's reflections on the collaboration with O'Neill

Fig. 13 Hurricane Preparedness List: a folding poster for families with a list of hurricane preparedness tasks. Source O'Neill

3 Conclusions and Implications for practice

The aim of this paper was to share the process of editing a design curriculum in the face of a catastrophic event. The focus on the future and hope allowed the students to continue their educational experience despite the catastrophe, which had the potential to interrupt their learning. By refocusing the curriculum the educators and students were able to create a context for authentic learning and to maximise the pedagogical experience. The educators, in this case, were able to use the event as an opportunity for reflection and collaboration, and an opportunity to share their emotions as a group through verbal and written reflections and drawings, as well as to interact closely with members of their communities in developing the solutions. Analysis of the feedback from the students' experiences, suggests that the activity was cathartic, and that it helped them to understand and empathise with the experience of others in a deeper way. The student approaches in their design solutions show that they embraced the concept of hope, and were able to create optimistic solutions in the face of this catastrophic event.

The recovery in Puerto Rico was taking place during the implementation of the course, but was painfully slow. By the end of the course, and the completion of the article, electricity still had not been restored in the rural town.

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Methods Across Borders: reflections of using design-led qualitative methods in Burkina Faso

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The paper presents an overview of activities of a funded project interrogating energy requirements of displaced populations in the Goudoubo camp in Burkina Faso. The overall project adopts a qualitative approach to enquiry using methods often employed by designers in participatory and human-centred design projects, with training provided for embedded researchers from disciplines other than design through a series of workshops prior fieldwork. The overall project aims to build a qualitative toolkit for enquiry into the daily lives of refuges and their lived energy requirements. The paper asks whether the engaged design methods, understood in the context of "global north" practices, are equally effective in sub-Saharan contexts. The paper introduces the methods used, the workshops delivered and then follows the experiences of the embedded researchers who present their findings, challenges and concerns about the delivery and implementation of "design methods" in the field. In their own voice, the researchers outline successes and failures, providing a critical examination regarding the degree to which design methods are transferrable across cultures and contexts.

qualitative methods; design methodology; energy; displacement; reflection

1 Introduction

In the academic disciplines of social anthropology and design, ethnographic or human-centred methods commit researchers to the study of people in real world settings (Bichard & Gheerawo, 2011; Gunn, Otto, & Smith, 2013) and such methods have gained traction in research on energy demand (Shove, 2004; Shove & Walker, 2014; Shove, Watson, & Spurling, 2015). Anthropologists and designers are using the systematic observation and recording of routine, tacit and sensory ways that people use artificial lighting, heating, electrical products and devices to analyse energy demand as a social, cultural or material practice (Pink, 2012; Wilhite, 2013). However, the application of these qualitative methods are in the Global North with little understanding on how these methods are transferred to other geographical contexts.

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It is currently estimated that 1.1 billion people live without electricity and 2.8 billion people rely on solid biomass to meet their heating and cooking needs (International Energy Agency 2030). Included in these figures are those who have been forcibly displaced from their homes (UNHCR, 2017). Energy is viewed as critical in order to achieve the core ethical aims of humanitarian assistance (Lahn & Grafham, 2015) but frequently falls outside the remit of humanitarian response (Lehne, Blyth, Lahn, Bazilian, & Grafham, 2016). As displacement situations become more protracted, there is a growing consensus amongst humanitarian actors that energy needs to be at the forefront of decision making alongside other basic needs such as food, water, shelter and sanitation.

Energy and displacement is an emerging space for design research, with significant potential for informing appropriate future development. To address concerns regarding the lack of reliable household energy data in displacement contexts, the Moving Energy Initiative (MEI) was launched in 2015[1] ensuring the energy needs of refugees and displaced persons are met sustainably in Kenya, Jordan and Burkina Faso. Thus far, a quantitative data model has been produced to estimate the cost of household energy use (spending and consumption), CO2 emissions as well as the cost of potential interventions (Lahn & Grafham, 2015). As the MEI lays the ground for future interventions, it has identified the collection and analysis of qualitative data on energy use as an urgent research priority. Qualitative data has been implemented periodically but has also "revealed large gaps in the overall information available" (ibid: 45). This gap of qualitative research has resulted in an ongoing project investigating Energy and Forced Displacement in Burkina Faso and Kenya led by the authors.

At the same time, the understanding, application and adaptation of such methods will potentially differ according to the discipline a researcher sits within. For example, different approaches taken by engineers and social scientists, often result with different outcomes and a lack of interaction. Though both approaches have their merits and their challenges, it often leads to multiple interventions "many of which have mixed results as the dominant techno-centric approach ignores subtle user needs, creating new social problems in the process." (Ray et al. 2014: 3).

This paper therefore does not solely address our understanding of energy in displaced contexts using qualitative methods. Rather, this paper seeks to reflect on the complex and "wicked problems" (Rittel & Webber, 1973) associated with interrogating energy practices of displaced populations, and the ways in which qualitative methods work within a multitude of contexts and "frames" (Goffman, 1974; Paton & Dorst, 2011). Our emphasis here is to understand whether qualitative research methods, frequently adopted by designers engaged in problem scoping activities in "global north" situations, transfer easily across contextual boundaries, namely cultures and disciplinary practices. Our aim is to understand whether we can safely assume that approaches to human-centred design can be implemented universally.

The paper is structured in the following manner. First, we introduce the research project and how our choice of qualitative methods were selected and supported in relation to interrogating lived energy practices in the field. Second, we present three case studies through the voice of our embedded field researchers, outlining their experiences in implementing the methods selected. Third, we discuss whether qualitative methods such as those used in participatory design research are transferrable across contexts and sites, and provide insights into political, social and cultural challenges which social scientists, including designers, need to consider when applying methodologies in the global north context outside that perspective.

2 Methodology

Proposed methods for this project were based on a number of criteria. First, a SWOT analysis was conducted on existing MEI data available at the time for both Goudoubo refugee camp, Burkina Faso

[1] The MEI is a collaboration between Energy 4 Impact, Chatham House, Practical Action, the Norwegian Refugee Council (NRC), the Office of the United Nations High Commissioner for Refugees (UNHCR) and the UK Department for International Development (DFID).

and Kakuma refugee camp, Kenya. Second, a literature review was carried out to contextualise the qualitative methods that have been used to research Energy. As a result, five key methods were identified: focus groups, interviews, participant observation, probes, and visual/sensory ethnography. These methods are explained in the subsequent section.

In order to determine whether these methods would be suitable to use for data collection, a qualitative methods training workshop, “Fuel Up”, was held in Ouagadougou, Burkina Faso in April 2017, in order to bring the research team(s) together and commit to an open-ended, iterative approach towards the research. The workshop set out to introduce our teams to qualitative approaches drawn from social anthropology and design, introducing ethnographic, human centred, object oriented, visual, participatory and collaborative methods for studying energy technologies and practices. In addition, the Principal and Co-Investigators, with academic backgrounds across social anthropology and design, wanted to establish a working relationship with the research team and wanted to learn from people’s previous experiences; identifying individual strengths and interests.

The aim of the workshop was to be as collaborative as possible, creating a safe space in which the team would put these practices to the test in order to endorse methods that are relevant in understand the lived energy experiences of refugees. By the end of the workshop, a set of common protocols for conducting field-based research in Goudoubo and Kakuma refugee camps was established.

These methods were then piloted in both Burkina Faso and Kenya over a two-week period. A second qualitative methods workshop, "Recharge", was held in Kenya to reflect upon the analysis and interpretation of qualitative data, challenges and limitations from the pilot studies, and to adapt/ refine methods for use in contexts of forced displacement.

2.1 Methods selected

2.1.1 Interviews

Data in this case was collected as a series of conversations/ interactions with a range of people (primarily those who are formally settled in refugee camps). Many of these interactions can be classified as ‘unstructured’ interviews where participants are encouraged to speak freely on a particular issue/topic. The style of interviewing resonates with Spradley (1979) who states: “ethnographic interviews as a series of friendly conversations into which the researcher slowly introduces new elements to assist informants to respond as informants”. These ‘friendly conversations’ are however based on a range of pre-prepared, open-ended questions (Croker, 2009) that “provide[ed] guidance on the topics, but left substantial room for manoeuvre for both the interviewer and the interviewee” (Naus, Spaargaren, Van Vliet, & Van der Horst, 2014, p. 440)

2.1.2 Focus Groups

Focus group discussions are also very common in qualitative research and within an international development context. Focus group data can offer insights that “cannot be gathered through one-on-one interviews” (Sweeney, Kresling, Webb, Soutar, & Mazzarol, 2013) and bring together “a broadly representative demographic spread” (Goulden, Bedwell, Rennick-Egglestone, Rodden, & Spence, 2014). Though focus groups allow us to understand attitudes and values as a collective, they are unable to determine interactions and behaviours and so research teams were discouraged from conducting them in the first instance in preference for other methods highlighted here.

2.1.3 Participant Observation

Participant observation was a way in which data was often contextualised. Observations were often aided by note taking, video, audio and photographs “in order to capture the discursive elements of data collection” (Truninger, 2011, p. 44). Observations were also used as a reflective tool to provide greater depth to the data.

2.1.4 Visual/Sensory Ethnography

Empirically, this project focussed heavily on visual/ sensory methods. These included re-enactments (Pink & Leder Mackley, 2014) where participants were asked to re-enact ("perform") everyday activities while the researcher recorded them. We also employed '*follow the object*' which resonates with Pink's paper (2011) on following domestic artefacts where "following the material culture of domestic life to see how objects move around and make the home. How do they consume energy as they move? How do they make invisible energy visible?" (ibid., p. 122). Research teams were also encouraged to capture as much as possible through photography, video and audio sound not only as a descriptive tool but to also stimulate discussion. As such, the use of photographs as part of the story telling process resonates with Lenette and Boddy's use of *photo-elicitation* which "involves using photographs to prompt participants to discuss meanings during interviews" (Lenette & Boddy, 2013, p. 81)

2.1.5 Cultural Probes

In this research, cultural probes were used as a method of enquiry in line with Celikoglu et al. (Celikoglu, Ogut, & Krippendorff, 2017, p. 85) who explain that they "rely on participants' self-documentation through photographs and narratives. This method is particularly helpful in environments where an observer's presence can distract from the everyday behavior of participants, such as in hospitals or domestic spaces". At the same time the use of disposable cameras to take photographs was suggested as well as the use of maps as discussed by Gaver and colleagues (Gaver, Dunne, & Pacenti, 1999).

3 Methods into Practice: Adaptation

The introduction and the methods overview were presented by the research team based in the UK, who structured the literature review and developed both the 'FuelUp' and 'Recharge' workshops to present methodological approaches to the research teams. The following section on methods into practice is presented by two embedded African researchers based in Burkina Faso. Having been introduced to and trained through a series of workshops regarding the design-oriented methods outlined above, the paper's voice now shifts to the embedded researchers' direct experiences in the field, challenges associated with context and culture, and a critical discussion about the usefulness of some of the methods employed. The discussion takes place through three case studies.

3.1 Case Study One: Re-enactments

3.1.1 How did you employ re-enactments?

We used re-enactments when we believed it was necessary but particularly when we realized that we were unable to capture every detail during the interview alone. This happened when the interviewee or someone else in the same household/area was naturally accomplishing a specific activity and we were occupied with questioning.

Re-enactments were mainly utilised to capture energy related practices but also many everyday activities such as how women roll up the loincloth on the head in order to carry fire wood, how various water coolers were used and utilised to keep water cool and fresh for example, when a hosting community man used a thread and a pin to attach his mobile phone to his pocket so as not to lose it during his activities (transporting food for refugees). These actions allowed us to understand how people perform different tasks and maintain different energy functions. For example, we would ask people to turn their solar lights on and off or ask them to show how they would charge lighting devices or hang them in the household when it gets dark outside (Figure 1).

Figure 1: a camp denizen demonstrating use of a solar lamp in Goudoubo Camp

3.1.2 What did you find useful/interesting?

It helped when we needed an in-depth look at what people were doing. In addition, we could capture the process through video/picture to share it remotely with the research team. This resulted in a more detailed understanding of the processes a posteriori. Also, we thought that collected footage could be more expressive than words, particularly in terms of facilitating a better comprehension for the remote team.

3.1.3 What did you find challenging?

Sometimes re-enactment would lose spontaneity and the natural aspect of the action. During a group discussion at the gas distribution centre, a woman comparing cooking with firewood and gas outlined that it was difficult to cook with firewood as she has to constantly blow onto the fire. She started miming how she blows with her mouth during this process. We wanted to capture this, but she refused. There are also examples of watching these processes but not being able to adequately capture them. For example, while observing the gas distribution centre we noticed a house opposite with a water can under the sun. The can was wrapped in fabric; it was undoubtedly a local water cooling can, as we were used to seeing in the camp. Indeed, as there is no piped water, refugees usually get water from the pump and due to the heat, they develop strategies to cool drinking water. In the meantime, a woman came to add water in the can and then she poured some over the top of the can [on the fabric]. Then, she brought the can under the shade. This was a crucial detail to capture, but the camera was not ready for that, as we couldn't assume in advance what was going to happen. Indeed, while reflecting retrospectively on those situations, we noted that most of the time you need to see the process in its entirety before figuring out its importance. In this case we couldn't

know at the beginning what the woman would do after filling the can and what she was bringing it under the shelter for.

Figure 2: heating coals for tea with bellows. Re-enactment methods can prove challenging in contextually dependent circumstances.

A last example is brought by a hosting community man using a pin and a thread to attach his mobile to his chest pocket, so as not to lose it when moving about. When we asked him to show us, we expected him to re-enact how he used the mobile device, internally attached to his pocket with unpredictable materials. At that moment people around us were laughing since they found it funny, our interest in this man's inability to buy a best suited accessory to secure his phone. Certainly he thought we were just asking him to re-enact so as to laugh at him like people around us was already doing.

3.2 Case Study Two: Follow the Object

We followed objects such as: cooling systems (water cans wrapped in fabric, canaries, goatskin coolers) cooking systems (solar cooker, metallic stoves, gas) lighting systems (lamps, solar panels), etc. (Figure 3). With the linguistic barriers, we could witness some events/actions without any needing to ask questions, as we were just observing those "followed objects" in their specific uses (particularly in the absence of the translator). This happened for example when we visited a home of the hosting community. There were some refugees women moving back from the bush (in the distance) with fire wood. One researcher stayed with the translator to pursue the interview and the other left to encounter women on their way back to the camp.

Figure 3: examples of energy objects interrogated using the "follow the object" method.

3.2.1 How did you follow these objects?

Objects were followed based on the discussions we had with different people in the camp. As the approach was flexible, we would begin by observing objects on the spot and start building a natural conversation. Thus, when we left a household to another we would ask general questions before targeting a specific object. Prior to these discussions, we already had in mind some idea of the objects we wanted to follow up on. We didn't need to write down what details we were going to look for, it was clear.

For example, one of the first objects we followed was the solar cooker (Figure 4). We already knew from previous interviews that the food prepared within the solar cooker was not appreciated because of its particular taste and the smell. We also knew that for

Figure 4: NGO issued solar cooker, an object interrogated using the "follow the object" method to uncover energy practices

some refugees, it was difficult to cook fast with it. Hence, our subsequent discussions could be built around the experience in terms of taste and smell, what they liked more, what they didn't like and why. Apart from the thematic discussion about cooking with the solar cooker (which could only be understood retrospectively, as nearly all the refugees were not cooking with it any more), most of the time we could observe the objects in use directly, and start building a story from there (E.g. exploring the different repurposes of the solar cooker pieces like building an animal enclosure fences from it, or using its cooking stove as an animals feeding pot). Those situations were made up of following objects through observations.

3.2.2 What did you find useful/interesting?

What was useful is that we could start building a broader story around a specific/isolated object to understand its different uses and functions. One example is the repurpose of the solar cooker sheet metal used as building material for the sheet metal house. There were also the animal skin water cooling recipients. We started knowing it as a water cooling recipient, then we discovered progressively through the interviews how it was manufactured and its other uses. Indeed, the vessels made from animal skin was also used to produce butter or keeping milk in regards to its

cooling abilities. Following such an object among refugees and hosting village communities permitted to confirm similarities and differences in terms of practices between both populations. The animal skin recipient appeared indeed as a cross cultural and cross borders object.

3.2.3 What did you find challenging?

It could appear difficult to combine the unstructured approach of the interviews to the following process, which implies systematic, repetitive and structured questions. A more structured approach was needed to follow objects but couldn't match within the unstructured interview. For this reason, we preferred starting the interviews randomly while keeping in mind that we could follow up subjects or objects if necessary. Depending on the area, the object or subject of discussion could change drastically. For example, discussions in the artisan centre could change or stop if people were busy with other tasks or customers. Similarly, the cattle market could be tricky as it was a wider space where several interactions between numerous individuals could take place at the same time.

3.3 Case Study Three: Probes

The opportunity to use probes in this particular project was limited, however, there are two notable examples of using them in this research.

3.3.1 The use of disposable cameras

The use of disposable cameras was trialled during the pilot phase with mixed results. It was quickly discovered that more detailed guidance for participants on what was expected from taking photographs. Some of the pictures developed stimulated interesting conversation and were used in additional discussions to illicit greater detail around everyday energy practices.

However, even after explaining to the translator the specific purpose of the disposable camera he was given, he started photographing randomly around him without considering the need to capture energy practices. The man wanted to show how good a photographer he was. We were obliged to re-explain the approach to him.

Furthermore, the use of such tools in politically sensitive contexts raises ethical/moral questions about the implications of giving and or leaving probes in settings for data collection. First there was the influence of the sensitive context and security constraint: CONAREF[2] and camp security guards didn't appreciate giving a camera to a refugee who would picture the camp every time he wanted and give the pictures back to "foreigners" for uses they couldn't figure out nor control.

Perhaps they would have accepted if we informed first before giving the camera. As soon as they had been informed by the refugee who went to them to "denounce" himself, they felt perhaps that something was going wrong.

3.3.2 Using Maps

We first used physical maps as a research team to familiarise ourselves with places we were told about (DEOU, FERERIO which are outside camp areas of transit between leaving Mali and arriving in the camp and places many refugees still reside). The maps were also used to check the orthography of the areas that were mentioned during the discussions. During discussions with the refugees the maps were used to help localize specific areas like fire wood collection places around the camp, other small cattle markets places, animals grazing/pasturages places (Figure 5). Maps did help to estimate places' positions in reference to the camp, but was difficult to use with illiterate people. There was also difficulty in visualising and understanding maps with small symbols.

[2] National Commission for Refugees

Figure 5: getting bearings with a map, employed as a cultural probe.

4 Reflections from the field: Context and Complexities

The "Fuel Up" and "Recharge" methods workshop delivered prior to data collection, were events where embedded researchers were introduced to new approaches of engagement outside their disciplinary practices, required some agility and flexibility in delivery outside the context in which they were developed and rehearsed. In this section, the researchers reflect on the success of design methods in situ, and associated challenges where adaptation was required to accommodate the nuances of circumstances and place.

4.1 Degrees of success of methods implementation

4.1.1 What worked? What didn't?

Overall, the use of these methods relies on building and maintaining strong interpersonal relationships over a period of time. Though easy enough to understand, some of the methods discussed above can be intrusive and were difficult to implement, especially when participants felt unconnected to the action. However, we ensured we had in-depth discussions with people before and after methods were conducted and would engage in appreciative actions that would reassure people that we were not out to collect data and data only. We regularly purchased food in the camp, so we would not come across as wasting time of restauranteurs, and we would also taste water when we would talk about cooling, refrigeration and efficiency as not to point faults in different cooling systems.

It is difficult to talk about a best method because there was a complementarity between them. For example, we observed and captured images and videos of women returning from fire wood collection and later were able to use those same pictures and videos as part of our unstructured interview process to better understand firewood collection in the camp. A re-enactment would stem from observations and interviews and we were able to freely follow objects as a result of the fluid methodology.

The unstructured interviews gave a sort of "freedom" to navigate across areas, topics, objects and facilitated the implementation of the other methods. Participant observation allowed us to seize the reality and was instrumental in helping us follow objects or find processes to re-enact. For example, we could feel how heavy a bundle of fire wood was, we helped the translator to pick his refilled gas bottle or to get his flash drive filled with films in Dori town. We discovered that he had a TV he

would watch every evening with people from the neighbourhood. This also confirmed that the energy needs go beyond lighting, cooking and power.

Printing the pictures from the disposable camera in advance was not the best solution, and the use of disposable cameras was complicated. If we had to classify per order we would prefer: using pictures and videos to capture illustrative details and prompt discussions, unstructured interviews for fluidity and finally participant observation to have in-depth insights of people's daily experiences while humanizing the relationship between us as researchers and refugees.

4.1.2 Using representations

The use of pictures and videos linked all methods together and worked well in all the three cases above as it allowed us as researchers to connect with many people. This helped to overcome some linguistic barriers as we didn't share the same language and sometimes we could show pictures rather than trying to describe objects or processes in words. We were also able to use pictures and videos as part of the transcription process.

4.1.3 Modifications and adaptations

Often discussions of the field create a misgiving that such a space is homogenous, and allowing a perception that methods are also homogenous and transferrable across sites in the field. This is a naïve perception, and conceals the complexities of camp with roles, conventions, politics and constraints for the outsider.

However, the use of multiple design methods in a refugee camp setting is a complex task that can be difficult to implement when there are time constraints and do not simply transfer from one context to another. In some cases, using these ethnographic design-led methods were not always clear and didn't account for the reaction of using such methods in a politically sensitive context.

5 Discussion

In the previous section, reflecting on the data collection and participatory engagement, challenges were presented regarding the operational delivery of the design-led methods in the field with different contexts. The embedded researchers, in their own voice, have outlined their first-hand experiences from attempting these methods with local research participants outside Global North contexts. In this section, we discuss design methods, as a form of knowledge elicitation, and ask whether knowledge, in this way, is transferrable across boundaries. Questions arise about the nature of the boundaries, the contexts presented, and the logistical challenges associated with researchers attempting new methods, out of context.

5.1 Is knowledge transferable from one context to another?

Knowledge is transferable, but it may imply specific challenges depending on the methods employed, the context of intervention and the possibility of negotiation. In this case for example, we had to intervene in the humanitarian context which is ruled by international laws and principles of protection towards refugees while regulating workers' activities in the camps. Even by following administrative procedures, we encountered several difficulties combining a fluid and open research protocol and within keeping of a humanitarian agenda whereby NGO's tend to protect information drawn from the field, and their needs for assuring stability while we are engaged in the field. They were certainly used by experience to seeing people collecting data through questionnaires in the camp, but how could they understand a research which deviates from usual research approaches in humanitarian areas? We had no research protocol with a set of structured questions as such to present, when negotiating the field access with our partners from various NGOs. How could they ensure that our interviews wouldn't cover some thematics we were not supposed to?

5.2 Fluidity or structure?

The attempt to collect and gather information in the project regarding lived energy experiences of displaced populations requires a degree of fluidity and spontaneity in order to be able to capture

rich and meaningful data. Participants in the field, however, are not immune or unaware of research practices, and a balance between their understanding and the researchers need for novel insights, using novel methods, needs to be struck.

Despite wanting to be as fluid and unstructured as possible – there needs to be a degree of steering and structure in the methods we employ in these settings.

Within an area like the camp, where several things are happening at the same time, unstructured approaches are appropriate as it gives a "room" to both the researcher and the interviewee to navigate across various thematics. Areas like markets or the distribution place are illustrative examples where the observation field is wider than in a household setting.

5.3 Clarifying a need for novelty

In new contexts, the methods of data collection, derived from participatory principles, are novel for many in the field. In some instances, however, too much novelty detracts or raises suspicion about the activities and methods themselves, challenging established conventions from many stakeholders, including camp residents, aid workers and even NGOs themselves.

Humanitarian actors knew vaguely that we were conducting an energy research project but were wondering "where exactly we wanted to go" and if yet more academic research was worthy with all the data already available on energy. This matter was reinforced by the fact that many of the humanitarian workers we encountered in the field are not specifically seasoned researchers who could imagine the peculiarities of our approach (and perhaps its existence) and the differences with the several quantitive surveys yet realized in the camp. Furthermore, these colleagues find it difficult to understand the need to constantly actualise data, particularly in a setting were the situation is constantly and drastically changing. To many, the camp is a "protected island" were the reality is crucially determined by several external factors, such as the amount and quality of the assistance, the phases and specific objectives of the projects, projects' specific actions which depends on the donators' priorities which are themselves determined by the international decisions or financial possibilities and so on.

One dimension of our approach was to have a holistic emphasis towards the research object. During the first steps of the work in the camp we were accompanied in refugees' households by aid workers and as the colleague was not familiar with the unstructured approach, he started complaining about the working methods, suggesting that we should have a focus on the energy topic.

5.4 Cultural implications of engagement

The researchers highlight that although knowledge may be transferrable, sensitivity to context and culture are of paramount importance during application in new fields. This is evident to them in methods like role-play or re-enactments. Asking participants to repeat simple actions and gestures places an emphasis and focus on the participant in question, leading to possible mis-interpretation of why re-enactment is being conducted in the first place, when not understood as a method of collecting and transferring knowledge.

With the refugees themselves, like the woman who refused to re-enact how she blows fire when cooking with fire wood, she didn't necessarily imagine how this performance could be a tangible example we could film and use to illustrate women's constraints with biomass fuel. For her, she felt uncomfortable and unsure of the rationale behind our line of questioning. Despite our explanations, as the interviewee couldn't fully grasp that the re-enactment is a part of our data collection process, as she is not used to see such methods in the camp.

5.5 Limitations in knowledge sharing across boundaries

This project held two-week long workshops in order to engage in collaborative training, research design and discussion. Some of the qualitative methods introduced were novel to participants, and

in retrospect, two weeks may be insufficient for building researcher capacity in employing new, design-led methods in sensitive contexts.

A variety of disciplines (including design) have outlined that the use of qualitative methods is important to humanise data and put it into context. Many authors note that without regard for the social and cultural context, interventions will often become irrelevant or ineffective (Sankar et al, 2006; Kumar et al 2013; Norman 2005) and in some cases qualitative methods are not suitable. However, in many scientific disciplines, the use of qualitative methods are welcomed and used to transform data back into quantitative statistics (such as word/phrase frequency) (Kelly & Bowe 2011).

Equally, in a development context, the use of focus groups and interviews are the predominant methods employed. Qualitative research in this context can often be seen as an "unaffordable luxury" (Kilcullen 2011) and the use of methods such as focus groups can be both time and cost-effective (ibid). At the same time the use of these particular methods feature as part of broader Monitoring and Evaluation frameworks for development programmes and can be used by practitioners to evaluate their own progress (Skovdal & Cornish 2015).

In light of this, the use of qualitative methods discussed in this paper, served as a reflective tool where methods could be tried and tested rather than refined and polished as superior to other methods.

Some final reflections from the embedded researchers encapsulates some of these challenges:

- Working together as an energy engineer and a sociologist was profitable for task-sharing, sharing observation-based impressions, discussing about energy object's technical aspects and reflecting on the overall research process. At times, there were disciplinary clashes where we wanted to pursue different lines of questioning due to the nature of their background. However, it was an opportunity to question each other on these differences and find solutions that would appease us both at times.
- Knowledge sharing across boundaries is opportune to facilitate both improved partnerships and enriched research results for Northern and Southern researchers. However, interdisciplinary methodological approaches come with some challenges.

The engineer shares his experiences:

- I have a technical background with experience in quantitative data collection. The qualitative approach was a new way to collect information. In the beginning, I felt uncomfortable with the qualitative approach questioning the focus on objects/topics which appeared to have no direct connection to energy. In my opinion, this approach brought a tremendous quantity of data but was a real challenge to collate, interpret and quantify. For that reason, it was at times easier to allow my colleague, the sociologist, to lead many of the discussions.
- The use of quantitative methods, in my experience, still offers benefits, given participants can provide false information in the hope of receiving something at the end, such as a solar cooker. For that reason, the unstructured approach used here is superior to softer qualitative approaches, since it allowed us to engage with the same people on numerous occasions over the course of 5-6 months. A relationship is developed and any discrepancies in the data can be clarified.
- Regarding the "follow the object" approach, this should be clarified as being "follow energy consumption habits" because many among the refugees were discovering the solar cook stove or solar home system, for example, which is what I think is what we were really trying to uncover.

In the sociologist's view:

- The qualitative research was definitely innovative in terms of combining several approaches to deliver a broader understanding of the energy lived experience. This was demonstrated

for example by using pictures and video as an integral part of the research process itself rather than just as illustrative material. However, this in itself provides a large quantity of data including visuals, videos, audio and written content which requires considerable more amount of time to translate and transcribe. In addition, some interviewees felt uncomfortable having their pictures taken and would start complaining that they don't want to be pictured because we would use the images for our personal financial benefits: sending the pictures of "miserable refugees" to philanthropic "white people" in Europe and embezzle donations on their behalf.

6 Conclusions

The embedded researchers provided a significant glimpse into the affordance of design-led methods in the field, such as re-enactments, role-play, "follow the object" and probes. In some senses, there is no clear indication that methods and the knowledge they elicit and capture across various boundaries are either successful, or unsuccessful. The attention to the boundaries in place, which define the communities (host/refugee); the roles (researcher/aid-worker); location (North/South) require flexibility, fluidity, adaptability and sensitivity. In deploying these methods, our embedded researchers describe a need for a degree of confidence in application, and time to develop the nuances associated with methods crossing disciplinary boundaries. One particular boundary, the University itself and its ability to afford access to knowledge, concludes our paper, as food for thought in how opening borders and boundaries to new insights, new experiences and sharing across borders can make significant impact not only in research, but for researchers as well.

There are some crucial constraints to access academic/paid journals in Africa. What can be self-evident for a western University researcher can be a challenging fact for local workers. This was partly resolved when particular literature on story telling was shared and exchanged during our first workshop. It could help more if, at that time, all the team could access to the literature which would have help thinking more on the methods (equal access to information).

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The Rhetorical Appeals in Interaction Design: decolonizing design for people of collectivist culture

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This paper aims to propose a conceptual framework to understand factors that restrain the engagement of users with collectivist culture background to computer technology. Drawing on the intersectionality of Hartson's Interaction Cycle and the classical rhetoric concept of logos, ethos, and pathos, this paper will discuss briefly the problem of HCI in the City of Surabaya, Indonesia as a case study. The application of rhetorical lenses in this research will aid the understanding Lloyd Bitzer's "rhetorical situation" that is active in the interaction of human and the machine. Rhetoric will also assist the actualization of designer's role from a merely aesthetic executor to a designer who equally engages in the conversation of HCI research and development along with HCI researchers and behavioural scientists.

interaction design; rhetoric; design theory; HCI

1 Introduction

In 1947-1948, a mathematician Alan Turing introduced the idea that the computer could exhibit the intelligent behaviour as humans do, by demonstrating a chess game with the machine as third player (Shah, 2013, p. 2). During an interview with BBC in 1950, Turing predicted that in fifty years a machine would be able to play games better than humans do, and be better at answering viva voce questions (Shah, 2013, p. 2). Turing's predictions were realized when the IBM super computer "Deep Blue" beat Grandmaster Gary Kasparov in a chess game, the IBM Watson won a Final Jeopardy game in 2011, and IBM's collaboration with music producer Alex da Kid in 2016 to create a song titled "Not Easy". In an interview in the Elvis Duran and the *Morning Show*, Da Kid saw IBM Watson as not the way to replace humans, but rather as a different way to get information and to be inspired. This emerging phenomenon denotes a significant change on human's relation to the computer technology, as the artificial intelligence is excelling to a 'humane' quality.

Human civilization is inevitably evolving towards a technology singularity; the merger of technology and human intelligence, that transcends Humanism, a natural form of human being, to Transhumanism, an accelerated form of humans enhanced by the sophisticated technology (Cordeiro, 2014, p. 237). Hayles (1994, p. 444) explains that there are three waves in the development of cybernetics; Homeostasis (1945-1960), Self-Organizations (1960), and Virtuality

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(1972-present). Hayles suggests that a conceptual shift is happening in matters of the material changes in artifacts on all three waves. The Homeostasis period marks the foundation of cybernetics during which, "human, animal, and machines to be constituted through the common denominators of feedback loops, signal transmission, and goal-seeking behavior" (1994, p. 441). Self-Organizations is a wave where "...organisms respond to their environment in ways determined by their internal self-organizations" (Hayles, 1994, p. 442). In the period of Virtuality, there is a detachment from a physical embodiment into informational patterns. Furthermore, within the Virtuality wave, human civilization is heading towards a Post-human wave, where humans and intelligent machines build a symbiotic relationship called Intelligent Augmentation. It is in the post-human wave, that Howard Rheingold asserts, "humans will contribute to the partnership pattern of recognition, language capability, and understanding ambiguities; machines will contribute rapid calculation, massive memory storage, and rapid data retrieval (Rheingold in Hayles, 1994, p. 467).

In many developing countries, such as Indonesia, three waves of cybernetics are not happening periodically as Hayes describes in his three waves. Instead, a cybernetics development phase is occurring simultaneously yet uneven across the archipelago, as a result of imbalance infrastructure development, computer illiteracy, poverty, culture and local influences. There are some regions and isolated tribes in Indonesia still in the Homeostasis phase because the local and spiritual leaders forbid their community to use modern technology. One such community is the Baduy tribes, who prohibit the use of electricity in their Kanekes Village, an isolated area in West Java (Ardan, 2008, p. 118). Still, in larger and highly populated capital cities in Indonesia, like Jakarta and Surabaya, there is a movement towards Smart Cities that are able to enhance access and availability to public services through the application of information and communication technology (ICT); this is seen largely in health and public administration services. The Surabaya City Government has strong commitment to promote the use of e-kiosk—touch-screen computers that are available in public offices, in that the citizens of Surabaya can independently register birth, death, or relocation of a family member through the e-Lampid website, or make an appointment at the nearby health center through the *e-Health* website.

However, the reality is, many people are not yet receiving any benefit from the device, as they are not using it with certain groups in the community that are untrained and unfamiliar with computer technology. A situation where over one hundred of people are waiting in a long line in a government civic records office to be served while there are couple of computer station unused becomes prevalent. According to The Indonesian Ministry of Communication and Informatics, on the computer ownerships statistic in 2014 shows that 72 percent people in Indonesia do not own a computer (The Indonesian Ministry of Communication and Informatics 2014). Thus, this larger group do not have the basic computer skill in operating computer-based government services, leaving the information technology facilities mostly left unused. Although they have the confidence to operate smartphones, they have a degree of anxiety to operate a touchscreen computer. Indeed, it is a contrast to the statistics of computer ownerships in Northern America, Europe, and some parts in Asia in which is exceed 50 percent (Global Computer Ownerships 2015). However, this number only represents one fifth of the world's total population. The HCI research has been focusing on this niche population and left the majority unexplored and unserved.

Cultural influences and traditions make for difficult implementation and wide-spread use of technologies, like the e-kiosk system in Indonesia. This is because the modern computerized system – with its strong influence of Western ways of knowing, communicating, and culture – is designed to facilitate independent and individual problem solving. People in some developing countries like those I mentioned, have a strong character of in-group collectivist, which means they are work in groups and are less individualistic (Zhao Fang, Nin Sheng & Collier, 2014). Person to person engagement is essential for communities like these, so the idea of Post-human, in which the existence of *human* (in this context is a city government officer as operator/ assistant) is replaced by the machine (an e-kiosk), challenges the nature of Indonesians as a collectivist culture. To some users in a collectivist culture, the rhetorical situation has already been activated through the

surrounded negative impressions and anecdotes before the user has made a contact with a device. David Blakesley describes anecdotes as, "a form of ideological maintenance. They express or reaffirm belief, acts that have a curative effect and share some functions with propaganda" (2002, p. 97). Some possible anecdotes that circulate among potential users in Indonesia towards the e-kiosk would be that they are "complex and difficult to operate", "confusing", that they break down easily" and the notion that there is "no need to worry about using the computer, because there will be an officer who is willing to assist you". These anecdotes prevent potential users to use the interactive system as it failed to give them trust. Local citizens would prefer to travel far and wait in line for hours to be served in civic records offices instead of doing it by themselves from home.

The inequality of technological advancement in communities without access to technology leaves a major gap in Human-Computer Interaction scholarship, especially in user experience research represents people and cultures from developing countries. The current knowledge of User Interaction/User Experience (UI/UX) design, which motored by Western computer engineers and scientists has failed to overcome the technology anxiety in the third-world countries. The dominant design of human interaction with computer technologies and programs may be based in studies of people in developed countries, but are still constructed through the theoretical lens of the Western culture. Teena M. Carnegie, in her paper *Interface as Exordium: The Rhetoric of Interactivity,* claimed that the features of the current technology such as images, video and audio can rectify face-to-face non-verbal cues in person-oriented environments (2009, p. 169). She also stresses that a social presence would not be necessary to the task completion in Human-Computer Interaction as a user would not be interested in engaging with other individuals while they were focusing on completing the required tasks (Carnegie, 2009, p. 170). This notion of independence is a reflection of Western's individualist culture; a culture focusing on self-reliance and solitude. It may not apply to users who came from a non-Western world as it challenges the nature of collectivist culture which values reciprocity, dependence, and harmony.

This paper aims to propose a new framework to support the engagement of users in developing world with a collectivist culture background drawing on the intersectionality of the rhetoric and Human-Computer Interaction. The application of rhetorical lenses in this research will aid the understanding on what Lloyd Bitzer calls as a rhetorical situation; "a complex of persons, events, objects, and relations presenting an actual or potential exigence which can be completely or partially removed if discoursed, introduced into the situation, can so constrain human decision or action as to bring about the significant modification of the exigence" (1992, p. 6), that is active in the interaction of human and the machine. Rhetoric will also assist the actualization of designer's role from a merely aesthetic executor to a designer who equally engages in the conversation of HCI research and development along with Human-Computer Interaction (HCI) researchers and behavioural scientists. This paper will dismantle the potentiality of Machine Rhetoric of computers in order to explore the possible ways that design can bridge the listening game between computer (machine) as a Speaker and users as a Listener. The first part of this essay will discuss Barry Brummet's rhetorical potential of the current technology, followed by the rhetoric discourse of design affordances in machines as Ethos, understanding the notion of users as listeners in rhetorical situation, and the actualization of designers to engage in the listening game.

2 Rhetorical Potential of the Machines

Rhetoric is an art of persuasion that is practiced widely in public speaking and writing; examples include arguing legal cases in a court, journalism and advertising. Classical rhetoric was predominantly applied in speech, and later in written texts, visual arguments, objects, and audio-visual rhetoric. There are three rhetorical appeals; Logo (rational arguments or the message) Pathos— (appeals to emotions of the audience) and Ethos— (character and credibility of a speaker). George Kennedy states that rhetoric is working as the possessed energy that drives the speaker to speak, the energy that is embodied in the utterance, the underlying energy in messages, and the energy exposed to the recipient in interpreting the message (Kennedy, 1992, p. 2). Barry Brummet

explores the rhetorical potential of machines. It is manifest in the enjoyment of sensory and aesthetic experience of people towards the machines which can constitute further 'attitudes, actions and commitments' (1999, p. 2). Brummet's definitions on rhetoric of the machines places emphasis on Pathos: the emotion, sensations, and enjoyment of the machine aesthetics. He explains, "The rhetorical effects of machine aesthetics are embodied in the meanings and significations facilitated by difference aesthetic experiences. In other words, an aesthetic experience is meaningful, and that meaning lends itself to rhetorical manipulation" (Brummet, 1999, p. 3). He highlights the understanding of rhetoric of machines theory as grounded from a possibility of "a system objects that generates meanings" (1999, p. 27).

Brummet defines machine aesthetics in three types of dimensionality; 1) Mechtech, classical machine technology and industrial machines 2) Electrotech, the aesthetics of high-technology machines of present times, and 3) Chaotech, the aesthetic of the decayed machines (1999). Brummet argues that the rhetorical struggle of the meanings of machines lies beneath people's social and psychological reactions to technology, and is shaped by their interaction experience with the given technology. Ewen and Ewen's statement in Brummet, that machine era transcends hope and horror, ambiguity and confusion, contradicts the computer anxiety phenomenon in developing countries. Kennedy contends that a mental effort and expenditure of energy are required in order to respond effectively to rhetorical assertions (1992). Brummet also suggests that design and engineering could offer strategies to construct an intentional rhetoric of machines, and specific premises for a social change; in other words, to prepare users psychologically to decode the message.

The rhetoric of computers engages in two ways; the first way is the external skin, the outer shape of the computer, and the second way is the software, a cyberworld; the utopia of fantasies within the machine once the user interacts with the computer. Classified as electrotech, the computer and high-technology mobile device acquire cognitive power, in which the processes and effectiveness are working down to the human scale (Brummet, 1999, p. 59). The present electrotech, ranging from video game consoles, computer artificial intelligence, home assistants, tablets, virtual reality gadgets, and hands-free speakers have dematerialized computers beyond its solid forms and becomes the extension of the human as it is controlled by the human gestures of touch and voice. Martins and Emanuel see the opportunity of interaction as rhetorical studies to be as ubiquitous to the digital world, as the interactivity of digital technology allows users to become participants, experiencing the sensations of being active in the process that is situated on the screen (Martins & Emanuel, 2014, p.1). The rhetoric of interactive websites aimed to persuade users to purchase a product or a service, include users in a brand activation, as participants in an on-going project. However, Brummet notifies that the surface form of present electrotech is an enigma to its beginner users, evoking both excitement and anxiety towards its appearance and logic (1999, p.65). This situation makes a device unable to yield its function and either able to clearly demonstrates its features. Thus, the knowledge of the depth of a computer intensifies solely in the continuous engagement to the computer software.

3 Affordances as Ethos

The principles of Aristotelian persuasion have been adopted by design theorists and explored by design practitioners as tacit values reflected in their works. A designer is no longer subjected to styling and aesthetic value of outer case of an object. In fact, in specific design cases, today's designers are pushed to gain a high understanding of subject matter such as the development smart cars and smart homes, that draws on natural science, technology, culture, process and making, social sciences and engineering. To explain the intersectionality of design and rhetoric, Buchanan (2001) calibrates logos, ethos, and pathos in design realms. For the designer, logos is technological reasoning or intelligent structure of subject matter; pathos is affordance: the way a product must be understood by targeted users in making it function, and Ethos is close to "brand", a gut feeling--a

manifested character or identity of a designer or manufacturer in a product or product series that comes from aesthetics or appealing shape of a product.
Affordances are not solely translated as pathos in the current electrotech, instead, as ethos relates to character and identity of an object, therefore, the four affordances will simultaneously generate ethos of an electrotech. The cognitive and physical affordances embodied in the surface of electrotech, are both pathos and ethos. The physicality of an electrotech must be able to deliver hints and clues on how to use the machine (pathos), and the experience while operating the machines will leave an impression thus will become a character reference of the electrotech (ethos). The logos and ethos also happen on cognitive, sensory, and functional affordances in the depth of electrotech, in which the logos is subjected to software and applications, content, messages, and interface design of the object, and the ethos will be left as the experience using the content of electrotech. In example, the brand of Apple used to be identified with Steve Jobs in which the ethos of Jobs (visionary and sophisticated design) embodied in its products. As ethos yields a character of electrotech, it therefore transforms a machine from a Non-Being to a Being, an object that brings a meaning to human.
The depth (software and operation system) and the surface (outer physical appearance) of present computer technology are of a different quality with boundaries and dualisms, which is encapsulated in the Interaction Design canon through affordances appeal. Donald Norman defines the term affordance by referring to Gibson's definition: "an attribute of an interaction design feature is what that feature offers the user, what it provides or furnishes" (Hartson, 2003, p. 316). Norman goes on to explain that Discoverability and Understanding are substantial in creating good design. Discoverability refers to what kinds of actions are possible, and where and how to perform them, while Understanding relates to how the product could be understood effortlessly in regards to its use of panels, settings, knobs, buttons, etc. Discoverability draws in five fundamental psychology concepts, affordance, signifiers, constraints, mappings, and feedback. Norman notes that affordance is a physical relationship between an object/artefact and the user that determines how the object could possibly be operated. According to Norman, there are two types of affordances; 1) Real Affordances: a physical appearance of an object, and 2) Perceived Affordances: characteristic in the appearance of the object that gives clue how to make the object be functioned (Hartson, 2003, p. 316).
Adapting Norman's model, Hartson (2003) details affordances in the context of Human-Computer Interaction (HCI) and usability engineering canon into four types of Affordances: 1) Cognitive affordance: "a design feature that helps, aids, support, facilitate, or enables thinking and/ or knowing about something", 2) Physical affordance: "a design feature that helps, aids, supports, facilitates, or enables physically doing something", 3) Sensory affordances "a design feature that helps, aids, supports, facilitates, or enables the user in sensing (e.g. seeing, hearing, feeling) something", helping users with sensory affordances and 4) Functional affordances: "design feature that helps users accomplish work (i.e., the usefulness of a system function) (Hartson, 2003, p.316-323).
In his book *Design of Everyday Things,* Don Norman also contends that experience is critical to interaction design, therefore the designers' objective is to produce pleasurable experience (1999, p. 10). His statement legitimizes Brummet's rhetoric of machine as pathos, which underpins the user's sensation, enjoyment, and emotional experiences during interaction with the machine. These sensory experience which extend beyond words are described by Kaufer and Butler as 'rhetorical situations' (1996, p. 34). Kaufer and Butler argue that rhetorical situation also involves "ancillary events", a preliminary milieu that aim to grab users' attention into the primary and sustained object. For example, a book cover or a packaging design are ancillary events to build awareness of targeted audience to the substantive object: the book content or the actual product inside the packaging.

Table 1. Hartson's (2003) Affordance Types

Affordance type	Description	Example
Cognitive affordance	Design feature that helps users in knowing something	A button label that helps users know what will happen if they click on it

Physical affordance	Design feature that helps users in doing a physical action in the interface	A button that is large enough so that users can click on it accurately
Sensory affordance	Design feature that helps users sense something (especially cognitive affordances and physical affordances)	A label font size large enough to read easily
Functional affordance	Design feature that helps users accomplish work (i.e., the usefulness of a system function)	The internal system ability to sort a series of numbers (invoked by users clicking on the Sort button)

Still, it is the way in which the user responds to the rhetorical situation that determines the success of the interaction design. In interaction design, there is a goal and purpose, therefore, the rhetorical situation must be able to both build users' awareness and facilitate them to accomplish the requested task. For example, the rhetorical situation in government e-kiosk for civil records must be able to motivate people to use it, and to direct people to successfully report birth, death or address change. Moreover, the rhetorical situation will be considered as a failure if the users are not engaged to with the technology, and thus will not be able to complete the task or simply be confused by the commands and the menu. Therefore, the user is an important element to the effective result of interaction design.

Table 2. Rhetoric appeals in Electrotech

Electrotech	Surface (Physical and Cognitive Affordances)	Depth (Cognitive, Sensory and Functional Affordances)
TV	Shape and Form (L, P, E) Screen size and resolution (P, E) Sound quality (P, E) Button (P, E) Brand Logo (L, E) Remote (P, E)	Interface design (L, E) Compatibility with other devices (L, E) Gesture commands (L, E)
Touch-screen / Non-touch-screen computers/ Tablets	Screen responsiveness (P, E) Screen resolution (P, E) Size (L, P, E) Casing material (L, P, E) Colour (L, P, E) Sounds (P, E) Brand Logo (L, E) Buttons Accessories (P, E)	Operating system (L, E) Software (L, E) Applications (L, E) Games (L, E) Compatibility with other devices (L, E)
Home assistant (Amazon Echo/ Google Home)	Size (P, E) Brand Logo (L, E) Colour (P, E)	Skills (L, E) Voice responsiveness (L, E) Compatibility with other devices (L, E) Smart home partnerships (E)
Rhetoric appeals: (L): Logos (P): Pathos (E): Ethos		

4 Users: The Other and the Listeners

The first section discussed the notion that the electrotech is an actualization of Western domination (developed countries) imposed upon other cultures (developing countries). This section will discuss user profile in a developing country (Indonesia) to understand the Otherness and Non-being boundaries and possibilities in building an effective rhetoric strategy. The Western culture is

predominantly rooted in the Ancient-Greek culture, which is well-known for undermining and dictating other cultures, foisting race superiority and male-domination. The result if the roots and manifestations of Western cultures in the developing countries that used to be under colonialism of the European for centuries, was that those countries found themselves as an indigenous people, situated in the colony as the Other and Non-Being.

The occurring phenomenon of the machine dominance as the speaker simulates Scott's western rhetoric concept that isolates Listeners (citizens/users) as a passive element. Scott (1975, p. 442) asserts that a listener-oriented rhetoric is foreign to Western culture. Triandis (cited in Novera, 2004, p. 477) explains that "In individualist Western culture, people think more in terms of 'I' than 'we' and focus on the interests of themselves and their immediate family. In an individualist culture the cardinal values are creativity, bravery, self-reliance, and solitude. In collectivist culture, the values are reciprocity, obligation, duty, security, tradition, dependence, harmony, obedience to authority, equilibrium, and proper action". The Virtuality that Hayles speaks of previously in the beginning of this paper, is a reflection of the Individualist Western culture: self-reliance and solitude, thus it eliminates the identity of collectivist culture: reciprocity, dependence, and harmony. The collectivist culture is a high context culture, where the meaning of communication also conveys through subtle hints such as body gesture, facial expression, a tone of voice, words choices, etc. People in high context culture tend not to care about the information in printed materials. For example, a person in Indonesia will automatically ask others how to operate a vending machine instead of carefully studying the step-by-step instructions that came with the machine. Even when the person is able to complete the task independently, they would still require a justification from a human being whether they did the required task correctly to get the peace of mind (Calhoun et al., 2002, p.296). In this notion, the existence of electrotech (which is intended to be the embodiment of the government) impedes the interactions of the citizens as listeners/users, the government as a speaker, and the message as service.

Poulakos' Sophistic Definition of Rhetorics implies the listening game. *Kairos* (the opportune moment), and *to prepon* (the appropriate) are two elements when the speaker (*Rhetor)* is acknowledging listener's existence. To Sophists- the teacher of rhetoric-, *logos is* their medium, and *Logos* is not to speak, but that which is spoken. Poulakos explains, "If what is spoken is the result of a misreading on the part of the rhetor, it subsequently becomes obvious to us, even to him, that 'this was not the right thing to say'. If silence is called for and the response is speech we have a rhetor misspeaking to an audience not ready to listen, or not ready to listen to what he has to say, or ready to listen but no to the things he is saying" (1983, p. 41). An audience needs to be in a state where they are ready to listen, to receive the information hence delivering a message requires an appropriate time and the right message content; "the right thing must be said at the right time, inversely the right time becomes apparent precisely because the right thing has been spoken" (Poulakos, 1983, p. 42). Furthermore, according to Poulakos' definition of rhetorics, it is possible to position electrotech as a medium or a *Logos*. An electrotech has been spoken as "inhuman" to users, creates the technological anxiety simply because it is a new idea of "human". As the users were [become] more familiar with human-to-human interaction, it conditioned the responses and restrict the actions (Poulakos, 1983, p. 44).

5 Designer as a Sophist

This paper opened with Turing's idea of machine having the minds of humans, or to be precise, "Is it possible to figure out digital computers which would be successful in the game of imitation?" (Turing in Gimenes, 2015, p. 427). This idea is challenged by Searle's Chinese Room Argument, that a computer program is not necessarily able to make a computer think, regardless the advancement of the technology is. Don Norman also claims, machines are 'conceived, designed and constructed by humans', while human minds are complex, imaginative and creative, fulfilled with common sense that built from years of experience (Norman, 2013, p. 5). Humans behave insufficiently towards a machine because it is not designed by the understanding of human behaviour. An interface

designer's locus is to facilitate communication between humans and the depth of the electrotech in a natural, effortlessly, and less depressing, despite complexe computer transactions.
Cultural conventions have a significant influence, primarily in the effectiveness of cognitive affordances, as they depend on the attributes of both the user and the artefact. In the perspective of user-centered design paradigm, cultural conventions can be pulled out into how to understand the user in terms of 'cognitive, affective or behavioral point of view, as well as the social, organizational, and cultural contexts in which users function' (Bowler et al., 2011, p. 723) since every user are unique. Electrotech is a rhetor, and users are listeners. When users interact with electrotech, they will figure out the way it operates (the Gulf of Execution), and later on will try to figure out what happened (the Gulf of Evaluation). Designers as a teacher (sophist) are helping users to be 'active', and to cross those two gulfs by a specific action (Norman, 2013, p. 38).
The 'bridge' that is proposed by Norman is known as stages-of-action model, and is an iterative activity of seven stages; goal, plan, specify, perform, perceive, interpret, and compare. Hartson merges Norman's stages of action with affordances concepts in usability engineering which he created the Interaction Cycle for User Action Framework (UAF). The Interaction cycle starts from Planning, Translation, Physical Actions, Outcomes, and Actions. Planning is about how interaction design direct user to know *what to do* with the artefact; Translation is how interaction design helps users to know *how to do,* translating task plans into specific actions; Physical Actions is how interaction design supports user *doing* the action; and Assessment is how well feedback in interaction design helps user to *assessing outcomes* of actions (Hartson, 2003, p. 329). Thus, this model will assist people from collectivist cultures to discover a better user experience design that fits to their needs.
The rhetorical appeals also emerge in the Interaction Cycle as shown in Figure 4. On Planning, a user will have first encounter to a medium (logos), where they will experience the existence of physical presentations such as sizes, colours, position and size of a button (affordance/ pathos), and also the identity of an artefact such as brand, logo of an institution/ company (ethos) will help them to translate what actions that should be executed. In the Translation phase, the interface design/ menu/ button (pathos) and commands (logos) in the artefact will help them to discover how to execute the specific actions. Physical actions are those that occur in the stage when the users do the required action with the help of button/ menu/ interface design (pathos) and commands (logos). Ethos is working along with the outcome as the impressions left felt by users during physical actions, and also during Assessment when users evaluate the outcomes with the feedback shown on the screen (pathos and logos).
There has been a growing interest in bringing the rhetorical canon to interaction design research, as the Field rhetoric plays a significant role in developing the discourse of experience design through application software analysis and development. Recent publications also suggest the implementation of a rhetorical lens in user experience will aid the discovery and the understanding of a design application software to a different level. There are three key concepts of experienced centered design that is adapted from a philosophical approach of John Dewey and Mikhail Bakhtin: 1) a holistic approach to experience, 2) continuous engagement and sense making, and 3) relational or dialogical approach (Salvo, 2001, 4). User/listener-oriented realm is also possible in the participatory design research with designers as the agent. In participatory design research, designers-researchers and the participants/ users are actively involved, iteratively formulating the problem solving. Participatory design research originated from Scandinavian countries in 1980s, when the computer technology was introduced to workplaces, and where the workers had limited knowledge towards computer technology (Spinuzzi, 2005, p. 164).

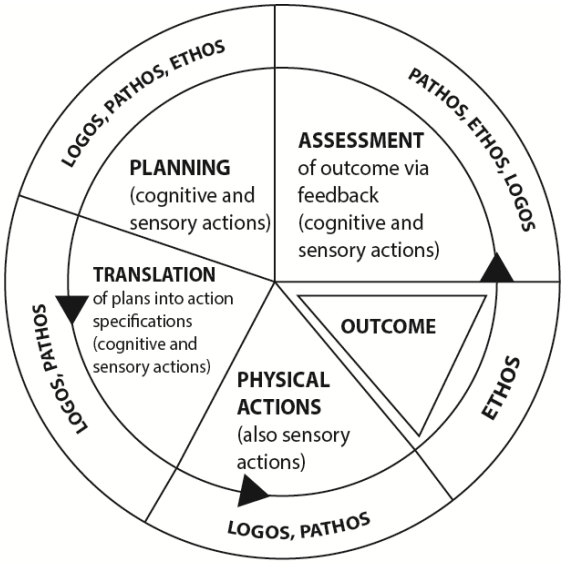

Figure 1. Rhetoric appeals in Interaction Cycle

A rhetorician Kenneth Burke's work of identification can also be recognized as parallel to the user experience design canon. Different to Aristotelian rhetoric, in which rhetoric is defined as an art of speech and ways to gain advantage in an argument, to Burke, rhetoric is about identification. His method of Dramatism and traditional rhetoric both are frameworks that aim to understand the human relations that form through language (Burke, 1969). On David Blakesley's "the Element of Dramatism" (2002), identification is aligned with interests or motives, which allows to an unconscious part. Human's motives are always enigmatic; the sense of incomplete leads a self to seek for identification with others. Burke said that a self-identifies itself to an object (person or something), acquires a shared belief, desires to be a part of another, and galvanized by the commonalities. Individuals build their identities by relating themselves to other entities such as physical objects, values, idol, characters, community, groups, brands, and beliefs. The association formed between an individual with other object is what Burkes called by consubstantiality. Shared substance constitutes an identification between a person and some property of person: to identify A with B, is to make A consubstantial with B. However, in consubstantiality, a self still possesses their identity that differentiates them from an object they identified with. This divide brings value to each individual. Burke's theory of rhetoric has the potential to be a perpetuation of the third concept of experience design, because parties who are engaged in an experience gaining a shared value, which makes them consubstantial. The tools to reach this consubstantiality is by a common language. Omar Sosa-Tzec claims that a rhetorical situation in a user interface is happening at the level of function, where the action is communicated by the visual artefact (2014). Sosa-Tzec argues that the visual artefact is a core element to such apps, the way its shaped and resonated to users controls the degree of effectiveness of an interface design, persuade people to choose them, to operate them hence accomplish the designated goals. He sees the relevance of information design in the persuasive interface design as it is constructed in information and interactions. He notes, "A persuasive interface partially depends on the way information relates to and is affected by the interactions with the system, and the way that both aid the user to make sense of the experience." (2014, 1). Sosa-Tzec grounds his position by using Kenneth Burke's rhetoric of identification and Aristotelian's visual enthymemes. He understands HCI through Burkean dramatism rhetorics concept that is called as Pentad, as a justification for his argument that persuasion in interface design derives from identification. Burke's Pentad uses five key elements; first is *Act* in which the action took place, second is *Scene*, the situation where the action takes place, third is *Agent*, the performer who enacted the act, forth is *Agency*, means and manner by which the agent performs the act, and the

last one is *Purpose*, the motive of the performer's act (Burke, 1969). Using the Pentad, Sosa-Tzec explains that the process of identification in interaction design is to establish paired relationships between designer, stakeholders, client and user. He also argues that a critical observation on Graphic User Interface (GUI) in a screen-based application is potential to formulate the possible motives to led the current design and then evaluate upon implications for the user experience. Sosa-Tzec adds that interfaces could also be regarded as interactive visual enthymemes produce a connection between interfaced and visual argumentation.

Zimmerman, Forlizzi, and Evenson of Carnegie Melon University claim that designers' role in interaction research is merely that of a consultant that created pretty interface design, relegating them to the end of the interaction design research process (2007). This isolation creates a situation where the produced artefacts were not effective since the designers came too late in the process. They further argue that design brings an added value to HCI research process. First, interaction designers provided a process to engage major under-constrained problems that were difficult to address by the traditional engineering approaches. Second, designers can integrate ideas from art, design, science and engineering in an attempt to create aesthetics yet functional interfaces. Lastly, designers engaged users in the process of developing the interface design by considering their needs and designers from the perspective of an external observer (Zimmerman, Forlizzi & Evenson, 2007, p. 5-6). Unlike engineers and business people, effective designers start their work by trying to understand the real issues, instead of trying to resolve a problem (Norman, 2013, p. 218). Designers are rhetorical thinkers, who focus on 'conceiving, planning, and making products that serve human beings' (Buchanan, 2001, p. 187). Buchanan claims designers are imperative in humanizing technology, bridging the interaction of human and computer, accommodating the diversity of human expectations underpinning in their backgrounds, culture, religion, origin, and living environment. Designers now concentrate on developing human systems which are found in their particular interactions and personal pathways.

6 Conclusions

The rhetoric of current high-technology machines or electrotech is defined by the enjoyment and excitement while having an interaction with it. This feeling will be the ethos of a machine, which works as image and identity similar to branding and people's 'gut feeling' about an entity. The rhetorical appeals; logos, ethos and pathos work simultaneously within the interaction process between human and the machine, detailed in design affordances and interaction cycle. Computer anxiety happens because of an incorrect interpretation of ethos in the form of difficult, complex, easily broken machines, and this is something that is not trustworthy. The machine as a rhetor are the Other and the Non-Being to users; its language is difficult to understand and not easy to operate. The physicality of the machines does not provide adequate information to users, and it does not support to the users to know what to do, how to do, how to proceed the action and provide feedback to users. Further directions for this paper have been suggested concerning case studies towards users in developing countries or communities with limited access to technological advancements. The investigations on how these users perceive the Rhetorical appeals of electrotech will give significant contribution to interaction design and machine rhetoric scholarships.

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How Consumers Read the Visual Presentation of Food Packaging Design in a Cross-cultural Context: a conceptual framework and case study

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How consumers understand products is based largely on their communication with the products, which is significantly influenced not only by the consumers' cultural background but also by the cultural context where the communication happens. This paper viewed consumers as readers who play active roles in the dynamic structure of communication and discussed how cultural factors affect consumers in reading design. Companies are now striving to create visually desirable products that can be universally recognized in the increasingly global marketplace. 'Lao Gan Ma', the most popular chilli sauce brand in China, was introduced as a case study in this paper. In spite of being well-known as a cultural icon in China, 'Lao Gan Ma' is little known to most non-Chinese consumers abroad. This paper presented a conceptual framework to culturally analyse the visual presentation of Lao Gan Ma's packaging design. In conclusion, it illustrated that consumers' reading is culture specific, and it provided detailed findings of how consumers read the visual aspects of food packaging design in a cross-cultural context.

communication; visual presentation; food packaging; cross-cultural context

1 Introduction

How consumers understand design of products is based primarily on their interaction with the products (Norman, 1990), as they cannot interact directly with designers of the products. The interaction process is also a communication process by which consumers are encouraged to understand designers' intention (Crilly, Good, Matravers & Clarkson, 2008). The consumers have been closely examined in this paper, and the term 'consumer' used here include not only those involved in the purchase process but also those involved in the process of visual consumption (Schroeder, 2002; Crilly, Moultrie & Clarkson, 2004). How consumers respond to design is affected by various factors (Bloch, 1995), and cultural factors play a crucial role in determining consumer purchase decision in the increasingly globalized marketplace. Companies are now striving to create

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products that can be recognized as visually desirable across different cultural contexts. Packaging, as a powerful communication vehicle, contributes to the improvement of visual appeal of products in a cross-cultural context. However, because of the differences in cultural preferences and values, the visual presentation of packaging design created in a particular cultural context should be modified in order to fit in another. In this paper, a popular Chinese food product was used as an example to explore how consumers with different cultural background and experience interpret the same visual presentation of packaging.

2 Background Literature

2.1 Two Views of Communication

There are two main views in the study of communication: process and semiotics (Fiske, 2011; (Shannon & Weaver, 1949; Gerbner, 1956; Jakobson & Halle, 1956; Newcomb, 1953). According to Fiske (2011), the process view regards communication as a process by which senders send messages to affect the behaviour or state of mind of the receivers through encoding and decoding. In short, it focuses on 'the transmission of messages'. The semiotic view cares about how meanings are generated through the interaction of messages, or texts, and people. In other words, it focuses on the role of texts in culture and how they are 'read'.

The two views in communication studies place the message receivers in different positions. From the process viewpoint, the communication fails if the message is misunderstood by the receivers, as a message is defined here as something transmitted from senders to receivers and accuracy is therefore important (Shannon & Weaver, 1949; Gerbner, 1956). Hence, receivers play a relatively passive role in the communication process. In semiotics, however, the receiver is identified as playing a more active role, for communication is no longer a linear process but a dynamic structure in which readers are used as a term to replace receivers. Messages serve as an element in this structure, and misunderstandings are not necessarily an evidence of communication failure as they may come from cultural differences between senders and receivers (Saussure, 1974; Peirce, 1958).

The semiotics has paid much attention to the impacts of cultural factors on how people read messages in different ways. This paper is based on the semiotic view that gives the readers, namely consumers, more attention than other parts of communication. The reading process could produce different meanings in the end as the readers interpret messages with their own cultural background and experience.

2.2 Consumer Response

Veryzer (1999) developed a nonconscious processing explanation of consumer response, describing how response to product design was formed. According to Veryzer (1993,1999), the nonconscious processing of consumer response involves perceiving the products and later evaluating its design's consistency with internalized rules that have been non-consciously acquired and developed over time, and consumer response is the result of consistency or inconsistency. Products possessing high consistency with a consumer's internalized rules facilitate more positive response than those with lower consistency. Moreover, there exists evidence that these rules may be modified or influenced by cultural forces (Segall, 1976). New elements and associations can be incorporated into the existing rules. Veryzer (1999) also pointed out that the acquisition of these rules started from the moment that individuals began to perceive the world, and different or similar perceptions may result from differences and similarities in the cultural environment in which people reside. For instance, Pittard, Ewing and Jevons (2007) have confirmed the universal preference for the divine proportion (i.e. the ratio of 1:1.618) across different cultures, for the divine proportion has been commonly found in nature and built environment, which makes it a shared experience for individuals with diverse cultural background. Research concerning design and consumer has also discussed various factors such as gender, age, attitude, personality, fashion trends, and innate preferences in affecting

peoples' reactions to design (Holbrook & Schindler, 1994; Bloch, 1995). These factors can influence how design is perceived, and thus shaping consumers' response to it.

2.3 Cultural Influences

Companies now are striving to build a successful brand that can be recognized across international borders. The likeability and visual transferability of their product within various cultural contexts are significant for this purpose (Pittard et al., 2007). Culture at the national level contributes to the success of design innovation (Griffith & Rubera, 2014). Thus, designers and companies should respond better to cultural differences in visual preferences. The degree to which a culture or subculture accept a particular design is influenced by the culture's values and preferences (McCracken, 1986; Bloch, 1995). Designers deliver messages to consumers by the use of desirable elements extracted from a specific culture, and in doing so they expect the messages to provide consumers with preferable meanings within the culture. However, something, be it colour, texture or material, desirable in one culture may be not in another (Armstrong, 1991).

Culture can be classified into three layers (Lin, 2007): physical or material, social or behavioural, spiritual or ideal, which was developed on the basis of Leong's three cultural levels, that is, the outer, the middle and the inner (Leong & Clark, 2003). Culture influences design preferences and tastes in a variety of ways. One way is through fashion trends, and another is on the basis of semiotic considerations (Jones, 1991). McCracken (1986) explored how culture meaning moves ceaselessly between its several locations in the world, claiming that culture constitutes the world by offering it meaning in that culture determines how individuals see the world and how they change the world by human effort.

2.4 Packaging Design

The recent study provided two major models that discussed the relationship between visual appeal of products and consumer response. Bloch (1995) identified cognitive and affective responses. The cognitive responses include 'beliefs about the product' and categorization. Garber's (1995) model illustrated in detail how visual aspects of products affect consumer attention and product categorization. It is effective to increase the visual appeal of products by improving its packaging design.

2.4.1 Food Packaging Design

Packaging is generally defined as a container that is in direct contact with the product itself, and is consisted of two major components, the graphical and structural (Ampuero & Vila, 2006). The significance of packaging design lies in that packaging of products helps attract consumers' attention (Schoormans & Robben, 1997; Clement, Kristensen & Grønhaug, 2013), position a product within a category (Ampuero & Vila, 2006), communicate product information, and build brand (Bloch, 1995; Underwood, 2003). Moreover, it continues to influence consumer experiences with long-lasting effect after purchase (Deng, 2009). It has been found that packaging dominates marketing effort (Dickson, 1994). Packaging has been used as a powerful communication vehicle to affect product choice, especially the choice of low-involvement products (Edward, 2013). Low-involvement products refer to those not requiring much thought and time when consumers are buying them (Silayoi & Speece, 2004). Food and drinks are typical examples of this category. Previous studies have indicated the importance of packaging design in food market (Wells, Farley & Armstrong, 2007; Vazquez, Bruce & Studd, 2003; Venter, Merwe, Beer, Kempen & Bosman, 2011).

2.4.2 Visual Presentation of Packaging Design

Consumer purchase decision is based on product attributes and brand values, which requires all of senses to be used, including touch, taste, smell, sight and sound (Lindstrom, 2005). Nevertheless, visual input overwhelms other modalities in the processing of packaging information (Posner, Nissen & Klein, 1976), thus making visual presentation more important than other aspects. The rapid growth of Internet shopping also encourages companies to spend more in the improvement of visual presentation of their product packaging. Research concerning visual aspects of packaging design

includes how various design features of package affect consumers' perception and evaluation of the product, such as the location of the product image (Deng, 2009). The visual presentation of packaging should perform a wide range of communicative functions, such as price information and brand identity (Schoormans & Robben, 1997).

Packaging design is generally referred to as having two aspects, that is, the graphical and the structural (Underwood, 2003). The structural characteristics mainly involve shape features, and the graphical has much to do with the label (Schoormans, Berge, Laar & Bergweitzel, 2010). Both characteristics affect consumer response. Moreover, Clement et al. (2013) revealed that in the in-store environment packaging design features are able to stimulate a bottom-up process by which consumers decide what to purchase. The design features like shape, ratio and contrast are easier to get consumers' eye contact than texts. This finding helps prevent products from being overlooked in the store.

3 Case Study

Lao Gan Ma Special Flavour Foodstuff Company, the biggest capsicum products in China with more than 20 kinds of products, has dominated the Chinese sauce market since 1990s. Lao Gan Ma, which means 'old godmother' in Chinese, is a household name in China. The product portfolio of Lao Gan Ma includes a wide variety of flavoured sauce, such as hot and spicy, beef soybean and chilli chicken, oil chilli and more. Soybean oil chilli sauce, as the pearl of the crown, is the most popular product among other products of Lao Gan Ma and is used as an example in this case study.

3.1 Introduction to Lao Gan Ma

Lao Gan Ma's product is known for a Chinese woman portrayed on bottles. That woman is Tao Huabi, the creator of Lao Gan Ma chilli sauce and also the founder of the privately-owned Lao Gan Ma Foodstuff Company, who started her business from nothing and eventually became one of the most successful women in China. The life story behind Tao Huabi and her chilli sauce is fascinating (Koetse, 2017). Tao was born and raised in a poor family. At the age of 42, Tao opened a small noodle bar near a local school, selling noodle with her own homemade chilli sauce after her husband died. She often gave discount and some extra food to poor students, which made her beloved in the neighbourhood and therefore she was called 'godmother' there. Tao's noodle business flourished, surprisingly not because of the noodle but that homemade chilli sauce which is so popular that sometimes customers came to purchase the sauce without the noodle. That was when Tao realized the great potential of her sauce and later turned her noodle bar into a sauce shop. In 1997, when Tao was 50 years old, Lao Gan Ma Flavour Foodstuff Company was founded. Lao Gan Ma is by now the largest and most famous chilli brand of China. Its products are also exported to more than 30 countries and regions worldwide.

3.2 Visual Presentation of Lao Gan Ma's Packaging Design

The visual presentation of packaging design is generally considered as having two components, i.e. the graphical features and structural features (Underwood, 2003). The packaging design of Lao Gan Ma, whether in terms of the graphical features or structural features, has been barely changed since 1997. It is visually presented as a rounded glass bottle with a red label, using a small portrait of Tao Huabi and three Chinese characters of Lao Gan Ma as the logo (as shown in Figure 1).

Figure 1 The visual presentation of Lao Gan Ma's packaging design. source: http://www.laoganma.com.cn/

3.2.1 Graphical Features

The graphical features usually concern colour, logo, typography, images and so on. In 1990s it was quite common that Chinese companies placed in their packaging design a real portrait of the product's creator to indicate its authenticity, even though that looks rustic and out of date. Lao Gan Ma is a classical example of this trend. Red is used as the main colour of Lao Gan Ma's visual identity, which is easy to explain as red is probably the most representative colour of China, and moreover, it is associated with hot and spicy taste. The application of traditional Chinese font in the brand name Lao Gan Ma as the trademark is another graphical feature of its packaging design. Those yellow circles with black and bold Chinese characters provide information about the product's flavour and raw material, with special emphasis on its originality. Other text information on the backside of the packaged bottle includes ingredients, nutrition, expire date, storage condition, place of origin, manufacturer, contact address and phone number. All texts are in Chinese.

3.2.2 Structural Features

The structural features mainly deal with size, shape, materials and other characteristics used for manufacture. The volume of a typical soybean oil chilli sauce of Lao Gan Ma is 280g, and the version of a larger volume is also available. The rounded bottle is made of transparent glass, which allows the sauce inside to be seen to consumers. Those small pits around the bottle body shown on both upper and lower parts distinct Lao Gan Ma from others. The cylinder-shaped bottle, together with the concave middle part of the bottle body, is ergonomically designed. Overall, the structural features of Lao Gan Ma's packaging design indicate in what way it can be used, and the bottle design helps visually communicate product attributes and brand identity.

3.3 Analysing the Visual Presentation of Lao Gan Ma's Packaging Design: a Conceptual Framework

3.3.1 Problems of Lao Gan Ma's Packaging Design in a Cross-cultural Context

Today, Lao Gan Ma is going international; its products are selling in more than 30 countries and regions, from North America to Africa. However, the internationalization brings about a problem of how the local meets the global. Although Lao Gan Ma sells well in overseas market, it is little known to non-Chinese. The business success is actually due to the large population of overseas Chinese, especially Chinese students who study abroad. For non-Chinese who frequently go to Chinese restaurants or supermarket, they are probably familiar with Lao Gan Ma. Nevertheless, it is difficult for them to appreciate Lao Gan Ma as Chinese do. It is even more challenging for non-Chinese consumers who seldom have contact with Chinese food to be aware of Lao Gan Ma chilli sauce as a Chinese famous product.

3.3.2 Cultural Meaning of Visual Presentation of Lao Gan Ma's Packaging Design

In order for Lao Gan Ma to respond better to globalization, it is important to associate its product packaging with cultural features that can be understood in similar ways by both Chinese and non-Chinese. McCracken (1986) posited that people buy products not only for their utilitarian functions but also for symbolic meanings they have. Douglas Holt (2004) conceptualized cultural branding, a novel methodology of branding, the crux of which is to build a widely admired identity myth of the brand. This identity myth appeals to consumers as it contributes to alleviating the cultural contradiction in society and thus lessening citizens' own identity burden. Culture is dynamic and changes over time. As a result, the previous identity myth may not fit with the new culture context and thus being unable to fix the contradiction. When we take a closer look at Lao Gan Ma with the cultural branding theory, it is found that the cultural meaning behind Lao Gan Ma plays a principal role in its success. Lao Gan Ma has been an iconic brand in China since 1997. That was when China joints the wave of globalization. With the rapid economic development, the life and culture in China were also changing very fast. New cultures, at that time, were formed with the impact of foreign culture, especially food culture, which leads to the awake of people's national consciousness. Social factors that affected the myth market of China since that period of time also includes the increasing population mobility, the reform and opening-up policy, social construction transition, a tidal wave of Chinese tourist/students abroad, etc. So since late 1990s, Lao Gan Ma quickly became popular among Chinese, especially overseas Chinese people, as it met their desire to keep authentic Chinese identity. All elements of Lao Gan Ma, including the endearing name, the rustic packaging and the authentic Chinese flavour, remind Chinese of their roots. Lao Gan Ma for Chinese consumers seems to be the symbol of Chinese identity and national consciousness.

Packaging, viewed as a tangible embodiment of a particular culture, is capable of strengthening or weakening the emotional bond between consumers and brand (Underwood, 2003). One way for Lao Gan Ma to achieve international success is to increase its global recognition by the improvement of its packaging design. To do this, there is a need to explore how consumers read the visual presentation of Lao Gan Ma's packaging design in a cross-cultural context, as consumers living in different cultural context interpret the same message in different ways. The result of interpretation may determine whether consumers will buy the product.

3.3.3 A Conceptual Framework

Based on the previous studies concerning cultural influences (Leong & Clark, 2003; Lin, 2007), a conceptual framework is presented here so as to culturally analyse the visual presentation of Lao Gan Ma's packaging design (as shown in Figure 2).

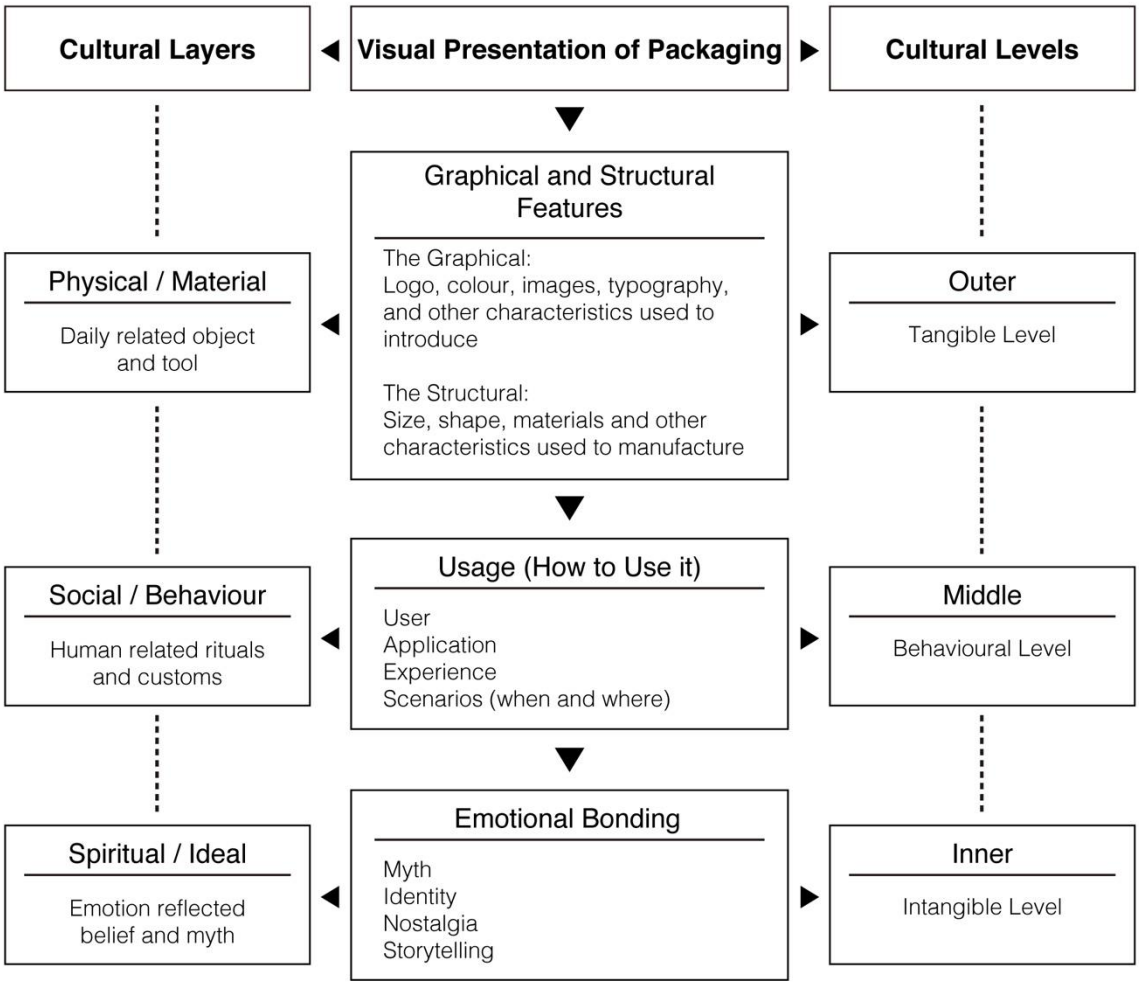

Figure 2 The conceptual framework

First, the outer (tangible) level deals with physical features, such as form, colour, material, etc. In Lao Gan Ma's case, the graphical and structural features are discussed at this level. For instance, the classical portrait of Tao Huabi, the creator and founder of Lao Gan Ma, can be classified as one part of the outer level of Lao Gan Ma's culture. All visual features, be it the graphical or the structural, belong to the material layer of culture. Second, the middle (behavioural) level involves human-related behaviour and the scenarios in which people could use the product. For Lao Gan Ma, it is primarily about how this product can be used. For example, the packaging design is expected to indicate the appropriate amount of Lao Gan Ma to be added to different food. Third, the inner (intangible) level contains emotional content, including stories, identity and more. Lao Gan Ma's emotional bonding with consumers lies in the symbol of Chinese identity and national consciousness. The storytelling of Lao Gan Ma also plays a part at this level. Specifically, it exemplifies the Chinese dream – everyone can achieve success and wealth as long as he or she tries hard. Moreover, it concerns nostalgia, which reminds Chinese consumers of the taste of home. The application of this framework in Lao Gan Ma is as shown in Figure 3.

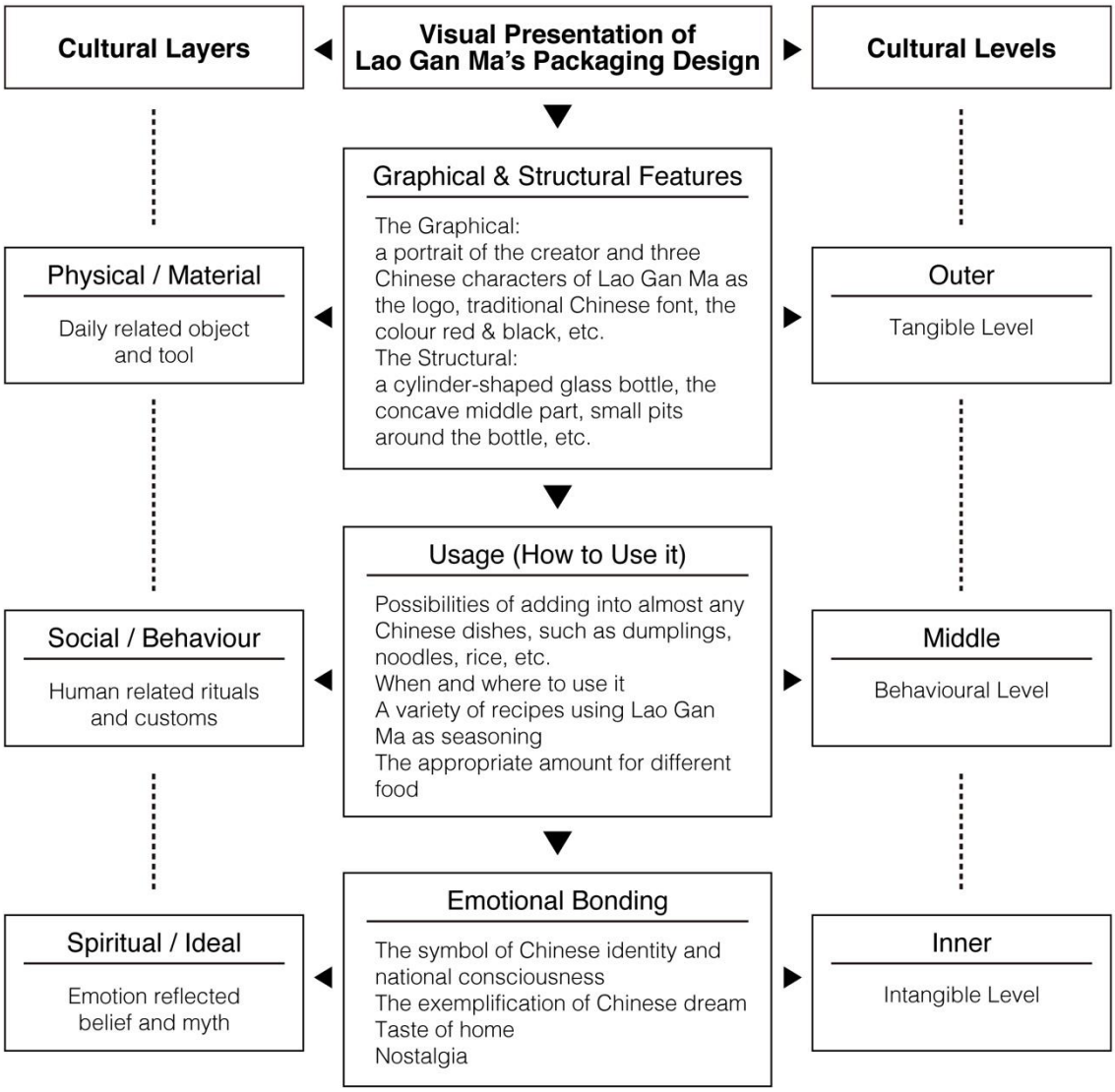

Figure 3 The application of the conceptual framework

3.4 Reading the Visual Presentation of Lao Gan Ma's Packaging Design: an Application of the Conceptual Framework in a Cross-cultural Study

Reading the visual presentation of packaging design in a cross-cultural context is affected by cultural factors in many ways. One way is on the basis of symbolic cultural meanings. The symbolic meaning associated with products is a consequence of collective effort in brand management and society's interaction with the brand, as well as the interpretation of the products (Underwood, 2003). Macro social trends often facilitate changes to symbolic meanings of products and brands (Holt, 2004; Holt & Cameron, 2010).

Figure 4 shows how consumers, both Chinese and non-Chinese, read the visual presentation of Lao Gan Ma's packaging design in a cross-cultural context. The information presented in the figure is collected from semi-structured interviews with postgraduate students from different countries. A total of twenty interviews were conducted, over five days. Half of the interviewees are Chinese, and the rest are originally from Finland, Germany, and Russia. Each interviewee was shown a bottle of Lao Gan Ma soybean oil chilli sauce and was asked specific questions. Three questions were of interest in this study: first, how consumers think about the graphical and structural features of the packaging of Lao Gan Ma; second, how consumers understand the usage of Lao Gan Ma simply via its packaging; third, how the emotional bonding between Lao Gan Ma and consumers change in a cross-cultural context. Interviews were structured lasting from 15 to 30 minutes, and researchers

took notes during the interview. Altogether twenty respondents participated in the interview, with twelve females and eight males. The median age was 24, ranging from 22 to 30.

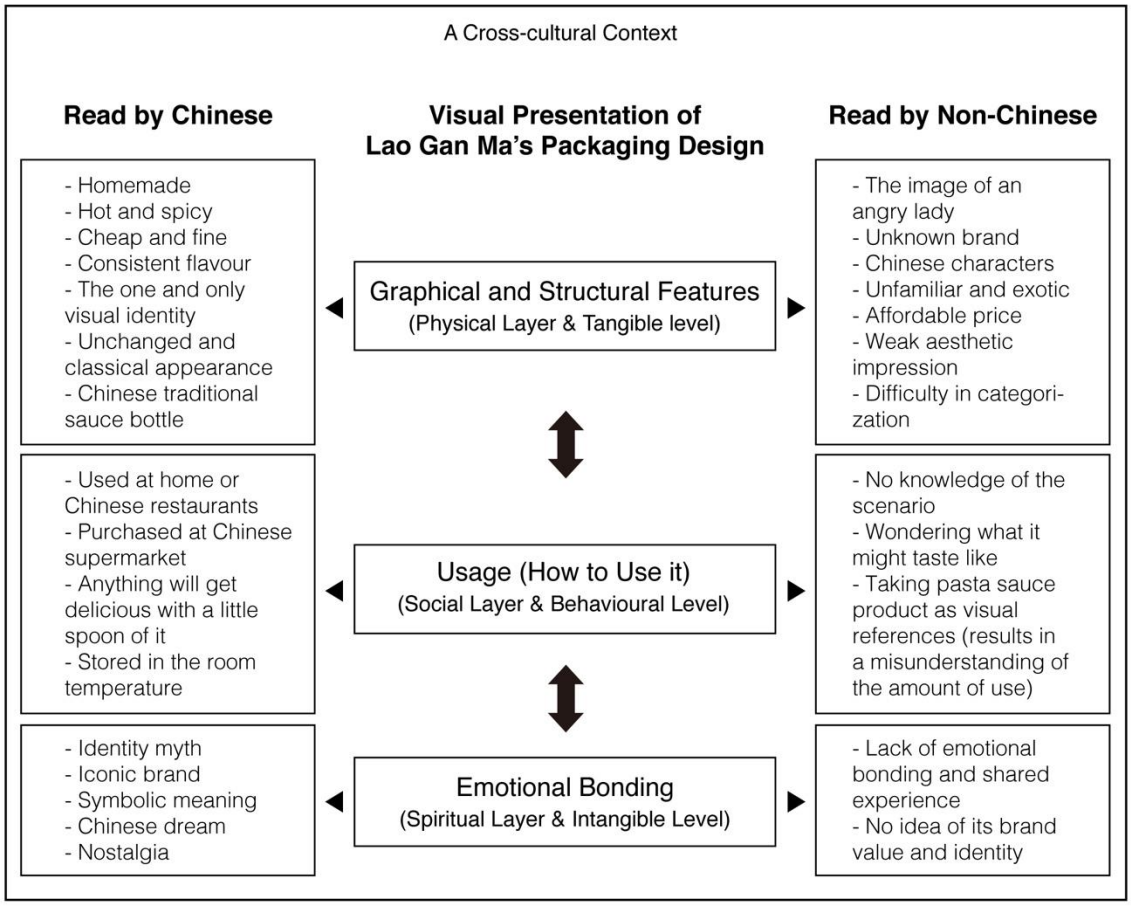

Figure 4 How consumers read the visual presentation of Lao Gan Ma's packaging design in a cross-cultural context

Without the knowledge of Lao Gan Ma either as a brand or as a product, the visual features familiar to Chinese are contrarily unfamiliar to non-Chinese consumers. The portrait of the creator, for example, is seen by some non-Chinese interviewees as an image of 'an angry lady'. The overall packaging is evaluated by most non-Chinese interviewees as exotic, and not surprisingly, with no strong aesthetic impression. The Chinese characters and the colour help them identify it as being produced from China. However, some of them found it difficult to categorize the product, as they have not used any Chinese chilli sauce before. A product category has been defined as a group of products that share a number of similarities and attributes (Schoormans & Robben, 1997). The categorization of products depends on their conceptual similarities that vary in different cultures. For instance, at least in China, a rounded glass bottle with large opening mouth is likely to be categorized as a container of flavouring sauce. As for the behavioural level, it is found from the interviews with non-Chinese that pasta sauce products are likely to be considered as visual references in this case, which may cause the misuse of Lao Gan Ma in cooking. In addition, the majority of non-Chinese interviewees said they were curious about the taste of Lao Gan Ma, even though they have little knowledge about how and where it can be used. Last but not least, the intangible level of the visual presentation of Lao Gan Ma's packaging varies significantly from culture to culture. Unlike most Chinese consumers, non-Chinese consumers did not hear of the story behind Lao Gan Ma and had no idea of what the product or brand is about. Consequently, the emotional bonding between non-Chinese consumers and Lao Gan Ma is missing.

4 Discussion

The visual presentation of packaging design created in a particular cultural context should be modified when encountering a different cultural context. This modification is necessary as cultural factors affect how people living in different context read the same visual message in different ways. There exists research that identified associations between specific visual features and consumer response (Westerman et al., 2013). Consumer experience visual features of packaging at three different levels: the physiological, the cultural and the associational (Hine, 1995). The physiological level involves universal and involuntary response. Take colour as an example, the colour red speed the pulse, while the colour green slows it down. The associational level is related to product categorization. The cultural level is linked to visual conventions that have been established in societies where individuals develop their internalized rule systems based on the visual conventions (Veryzer, 1993, 1999). Consumers in various cultural contexts therefore read the visual message with their own rules. For example, the colour dark red (nearly black) of Lao Gan Ma chilli sauce sometimes discourage the potential consumers, for most chilli sauce known to non-Chinese consumers are bright red which evokes the image of fresh chilli. Those who have little knowledge about Chinese food may take the dark red sauce as expired. The misreading of Lao Gan Ma's visual presentation, to some extent, provides an explanation of why it is unpopular among non-Chinese abroad.

In order for companies to produce internationally successful product, the cultural integration was proposed as an effective approach, concerning the integration of one particular culture and another, and by doing this it is possible to create a universal acculturation (Lin, 2007; Leong & Clark, 2003). The cultural elements of integration should be carefully selected. In the case of Lao Gan Ma, the cultural integration aims to enable its packaging design to visually communicate similar cultural meaning in the cross-cultural context for both Chinese and non-Chinese. This cultural integration intends to develop a new visual presentation of Lao Gan Ma's packaging design by incorporating design features embodied contemporary western culture into Chinese cuisine culture. Despite the less popularity of spicy food in the western food culture, competitors such as Sriracha and Tabasco are globally welcome. In fact, the cultural integration requires a modern expression of Chinese culture to be created. Chinese people have tight emotional connections to Lao Gan Ma, but the old story is supposed to respond better to the globalization by 'speaking again' in new cultural contexts, so as to raise global awareness of Lao Gan Ma as a classical Chinese chilli sauce.

In addition, there is a need to take a larger diversity of cultural scenarios and contexts into consideration, so as to make necessary changes in the packaging design of the same product depending on the area where it is marketed. Each positioning strategy is associated with specific graphical features of the packaging design in some or all of the visual variables (Ampuero & Vila, 2006). Thus, the research on how cultural factors affect consumers' reading of the visual presentation of the product packaging may contribute to the planning of marketing strategy. For this purpose more issues need to be considered. Creusen and Schoormans (2005) outlined six different roles of product appearance for consumers, i.e. communication of aesthetic, symbolic, functional information, ergonomic information, attention drawing, and categorization. These roles probably make sense to packaging design as well. Take categorization as an example, on one hand, consumers prefer unique packaging which stands out from other competitors. On the other hand, if the package deviations are too strong to be grouped into a specific category as perceived by consumers, the product might be unacceptable. A compromise thus has to be made.

5 Conclusion

Following with the semiotics view of communication, consumers in this paper are seen as readers who play an active role in the dynamic structure of communication. How consumers respond to a product largely determines the consumer purchase decision, and therefore it is useful to understand the factors affecting consumer response formation. Previous studies explored how various factors,

e.g. gender, age, personality, innate preferences, affect consumer response to design (Holbrook & Schindler, 1994; Bloch, 1995). Nevertheless, there is yet inadequate research on the role of cultural factors in shaping consumer preference. Veryzer's theory suggested that the internalized processing algorithms, or rule systems, that direct consumer response to design are nonconsciously learned very early in life and developed over time (Veryzer, 1993, 1999). The rule systems could be largely influenced by culture and convention ((Pittard et al., 2007)). Similarly, it has been found that consumers in different cultural context see things differently. The design feature preferred in one culture may be not in another.

Due to the increasingly globalized marketplace, companies are now making huge effort to design globally desirable products. To do this, there is a need to create likeability and visual transferability of their products within cross-cultural contexts. Improving packaging design is an effective way to increase the visual appeal of products within various cultural contexts, for packaging is a powerful communication tool in affecting product choice, in particular, the choice of low-involvement products like food and drinks (Edward, 2013). Lao Gan Ma, the most popular Chinese chilli sauce brand since 1990s, is a household name in China. Although Lao Gan Ma has become extremely successful in China, it still struggles for a better international recognition. The case study of Lao Gan Ma introduced in this paper explored how Chinese and non-Chinese consumers read the visual presentation of its packaging design in a cross-cultural context. The conceptual framework contributes to the analysis of the cultural meaning in the visual presentation of Lao Gan Ma's packaging design. Semi-structured interviews with students from different countries were used as an approach to collect information. It suggested products be packaged with different visual presentation depending on the area where it is marketed. The results will provide companies and designers with a better understanding of how to create globally recognizable products by identifying cultural preferences and values in visual aspects of product packaging.

6 Limitations and Further Research

A couple of limitations of the case study have to be noted here. First of all, only a small number of interviews were conducted in this study, and the interviewees were selected from a specific group (i.e. international students at Tongji University). Secondly, the products were not evaluated in the usual in-store environment where more factors affect consumers' response and their product choice.

For further research, the sample should be more carefully selected, and a larger number of case studies should be conducted to support and develop the findings. Additionally, further research could be done to make use of other methods, such as observation in in-store environment.

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A Case for Caribbean Design Principles

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This conceptual paper, under the topic track "Culturally-situated practice as design confidence", seeks to propose principles for good Caribbean design and establish a case for design in local cultural policy in West Indian islands; showcasing how a healthy relationship between design and local culture can contribute to creative and culturally proud solutions that can potentially offer economic and social benefits. Five fundamental principles to guide good Caribbean design are proposed, inspired by Caribbean culture and society. This paper applies these principles to show how culturally-situated design and designers can contribute to environmental and economic improvements; cultural continuity - making/keeping cultural traditions relevant and accessible; and visual/language preservation - culturally situated design for identity and communication. This study draws on insight, case studies and research to present the potential value of establishing fundamental Caribbean principles of good design and integrating design and culture in order to reap social, cultural, economic and environmental benefits.

design; principles; culture; caribbean

1 Introduction

In this conceptual paper, the author aims to establish a case for design inclusion in cultural policy in West Indian islands; propose principles for good Caribbean design; and showcase how a healthy relationship between design, designers and local culture can contribute to creative and culturally-proud solutions that can potentially offer economic, environmental and social benefits. Drawing on case studies, analysis and research, the value of understanding and fostering Caribbean design is presented. A case is made that supporting culturally-situated design/designers could provide environmental and economic benefits; contribute to cultural continuity, making/keeping cultural traditions relevant and accessible; and contribute to visual/language preservation.

2 Methodology

A qualitative methodology based on observational, experiential and participative primary research, along with secondary research, was selected to better understand "good Caribbean design" and identify and propose principles to better support culturally-situated design development.

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In order to propose principles that could better inform and support design and cultural policy development and applied design practice, considerations were made that influenced the methodology: these included exploring

- The role design plays in existing local cultural policy documents
- Factors influencing the qualification of “good” for Caribbean design
- Principles that could support, qualify and enhance “good Caribbean design”
- How these principles compare with widely accepted principles of “good” design
- Cases analysing and exemplifying the proposed principles from culturally-situated designers

This study presents an analysis of policy documents, relating to design, from Barbados and Trinidad and Tobago along with historical references for a deeper understanding of the local context. Literature was reviewed to explore, analyse and challenge design principles and policy approaches for qualifying and encouraging the practice of “good design” in the Caribbean. Two case studies were developed, focused on design in practice, exemplifying the lived experience of Caribbean designers of multiple national backgrounds, namely Trinidadian, Barbadian and Guyanese.

2.1 Data Collection & Analysis

Over 400 hours of observational, experiential and participative research and unstructured interviews occurred over almost two years of data collection for the case studies. This occurred through studio and workshop visits; discussions; attendance and participation in practical sessions, taught classes and a competition; design, making and experimentation; along with other forms of online observation and engagement.

Secondary research, specifically government documents, articles, books, papers and journal publications, was reviewed and analysed, providing context for proposing principles of good Caribbean design.

Proposed principles were discussed with some Caribbean designers and case-study participants and were refined and shared at the University of the West Indies’ “Th?nk Symposium” on April 27, 2017. These discussions and opportunities to test responses to the proposed principles were helpful in refining and proving the validity and relevance of the principles to Caribbean design.

3 The Caribbean Community (CARICOM) Context

English-speaking Caribbean islands, often referred to as the West Indies, have shared political and social history. According to Professor Rosanne Adderly “…considering British Caribbean colonies collectively as the "West Indies" had its greatest political importance in the 1950s with the movement to create a federation of those colonies that could ultimately become an independent nation…” (Balderston, Gonzalez & López, 2000, p. 1584). More recently, many West Indian islands and territories, including Guyana, now form the Caribbean Community. According to the CARICOM website,

> *“The Caribbean Community (CARICOM) is a grouping of twenty countries: fifteen Member States and five Associate Members. It is home to approximately sixteen million citizens, 60% of whom are under the age of 30, and from the main ethnic groups of Indigenous Peoples, Africans, Indians, Europeans, Chinese and Portuguese. The Community is multi-lingual; with English as the major language complemented by French and Dutch and variations of these, as well as African and Indian expressions.” (Secretariat, 2017)*

CARICOM countries have many similarities that influence culture, being largely shaped by European colonization, the enslavement of Africans and the servitude of indentured labourers. In many islands, before, after or in addition to black slaves/former slaves, there were Indian indentured labourers or European indentured servants (Tinker, 1974; Byrne, Martin, Moody, & Vaughan, 1986). Descendants of slaves, servants, labourers and poor immigrants have largely shaped and influenced

culture in the Caribbean. Commonalities such as these make for a people whose historical roots are tied to societal "have nots" and "outcasts" and could suggest that, ideally, Caribbean design should value inclusivity and accessibility, as the exclusion of colonialism is not a treasured memory. Some Governments actively work to dismantle the lasting effects of colonialism. Directly preceding its list of policy goals, the National Cultural Policy for Barbados (2010) states that

> *"In order to bring about the total subjugation of the enslaved Africans, the colonial powers set about to destroy their culture, their way of life. But the most damaging and enduring strategy was employed after the official abolition of the slave trade. Adeptly using their European educational and religious institutions, the values, norms, beliefs, and family structure of the newly emancipated people were systematically discredited and discarded. This resulted in Barbadians of African descent regarding their culture and their heritage with a sense of shame and embarrassment. This is a situation from which we are in the process of recovering even today." (Ministry of Community Development and Culture, 2010, p.14).*

South of Barbados lies the Republic of Trinidad and Tobago, a diverse society with many religious and ethnic influences that are reflected in the values, world views, attitudes, cuisine, dress and behavioural patterns of its people (National Cultural Policy Draft 3, 2008). This diversity is undoubtedly integral to the culture of the Republic. The Republic's National Cultural Policy refers to the varied characteristics of its many communities and determines that the national cultural identity will include aspects of each. It goes on to differentiate between the national identity and the individual's cultural identity, which "will be based on his/her familiarity with the cultural characteristics of the community of which he/she is a part as well as in relation to the surrounding community/communities." (National Cultural Policy Draft 3, 2008, p.20). This duality of cultural identities could provide opportunities and challenges for sharing and inclusion in aspects of national culture that are absent from the individual's cultural identity.

Design policy for Trinidad and Tobago and Barbados is difficult to find. Instead, while design may not be mentioned specifically, it may be alluded to under policies for "Cultural and Artistic Promotion" in Trinidad and Tobago's National Cultural Policy which states that "Incentives and encouragement should be given to local advertising companies in the use of local content and practitioners in the creation and production of their ads…" (National Cultural Policy Draft 3, 2008). Advertising agencies are where many graphic designers find employment in many islands. A review of the Barbados National Cultural Foundation website and an online review of information on the Barbados Ministry of Culture, Sports and Youth did not reveal specific mention of design policies. Rather, it may be assumed that design is included in "creative expression" or development of "a creative economy" ("Government of Barbados: Ministry of Culture, Sports and Youth", 2017).

In both Trinidad and Barbados, design is most closely addressed under cultural policies. While Trinidad is the primary point of reference, as former British colonies, other Caribbean islands like Barbados, Jamaica or Guyana that share common history with Trinidad, may find some information on culture and design, as presented here, to be somewhat relevant.

4 What is Good Design?

4.1 Good Design and an International Perspective

Aesthetics, beauty and how things look are almost inevitable when discussing design. Mads Nygaard Folkmann notes, "…working with aesthetics is often regarded as a core competence in design… the pervasive attention paid to aesthetics can be annoying to designers, as it implies that they work solely with artistic matters of surface, appearance, and styling as opposed to, for example, functionality." (Folkmann, 2010, p.40). Appeal is important, however, an over-emphasis of "looks" to qualify design as "design" and as "good" could be problematic. Folkmann adds, "…an appropriation

of design by the aesthetics of art, implying a view of design as art, may hamper an understanding of the unique complexity of almost every design object or solution…" (Folkmann, 2010, p.41).

A similar caution regarding the misunderstanding and misappropriation of design is given in the India Report when the Eamses, speaking of selecting teaching candidates, firmly issue a warning to

> *"…be extremely careful [of] …anyone who would look upon the work in the institute as his "chance to be creative" …beware of the professional or specialist who when confronted with a problem having to do with design – seems suddenly to abandon the disciplines of his own profession and put on his art hat – this can happen to those who are otherwise most rational – doctors, engineers, politicians, philosophers." (Eames & Eames, 1958, p.13)*

The Report serves as a suitable reference because India, like the Caribbean, does not share the tradition of aesthetic theory in European philosophy, and its people and influences can be found throughout the Caribbean. At the time of the report, India wanted to develop a design training programme that could help "the small industries… [and] resist the rapid deterioration of consumer goods…" (Eames & Eames, 1958, p.6). Balaram summarises the perspective of design in the Report: "Viewing design as an activity that improves the quality of life… the Eameses recommended a sober investigation into those values and qualities that Indians consider important to a good life…" (Balaram, 2005, p.14). This investigation was to include "a restudy of the problems of environment and shelter; to look upon the detailed problems of services and objects as though they were being attacked for the first time; to restate solutions to these problems in theory and in actual prototype; to explore the evolving symbols of India." (Eames & Eames, 1958, p.6).

4.2 Good Design and the Caribbean Perspective

A similar approach to fostering design, as distinctly different from art and aestheticization, may be critical to optimizing the function of design in Caribbean spaces, where design is often overlooked or treated as art in policies. What constitutes as "good design" may differ across Caribbean ethnicities, though there are some commonalities. Common historical factors like slavery, indentureship and the lack of resources associated with such a socio-economic status may have influenced a Caribbean "make do" approach to design. It appears that new items were created from what was available or affordable, even if not ideal, resulting in innovations that have informed culturally relevant products, services and practice. This is evidenced in the use of banana leaves as receptacles/wraps in the making of Trinbagonian pastels, Antiguan ducana and Barbadian conkies; monkey pots/jars and jukkin/jookin boards in Barbados, Jamaica and other islands; bent-bamboo structures during Divali celebrations in Trinidad; hand-painted hardboard or wall signage in Jamaica and Trinidad and branded rum shops in Barbados (see Figures 1-4).

Figure 1 - Pastels (left) Source: http://www.allaboutcuisines.com/recipe/trinidad-pastelles-steamed-cornmeal-pastry-meat-filling; Ducana (centre) Source: https://tarasmulticulturaltable.com/ducana-antiguan-sweet-potato-dumpling/; Conkies (right) Source: http://www.tasteslikehome.org/2007/11/time-for-conkies.html

Figure 2 – Bent bamboo at Divali Source: https://caribbean.briFshcouncil.org/programmes/society/divali-trinidadtobago

Figure 3 - Jukkin Board (left) Source: Author; Monkey Pot (centre) Source: Author; Branded rum shop (right) Source: https://www.barbados.org/barbados-rum-shops.htm

Figure 4 - Nurse Signs, Jamaica (left) Source: https://www.instagram.com/p/BawCurrjIPt/?hl=en&takenby=Nursesigns; Bruce Cayonne wall-sign (right) Source: https://www.instagram.com/p/BaXZA-Uhqkb/?takenby=iamthesignman

This practice of design suggests that Caribbean people are capable of addressing problems and generating solutions that can "appraise and solve the problems of our coming times with… tremendous service, dignity and love…" (Eames & Eames, 1958, p. 14), the words the Eameses used in reference to the Indian Lota vessel. Similar to the approach that India took, an intentional and concerted effort to foster good Caribbean design can be valuable to national development and addressing problems.

4.3 Good Design and the Popular Perspective

Studies show that people (64%) trust search engines, like Google, as "the most credible source for news and information" (Beaubien, 2015, p.15); that subjects trust Google as an authoritative search engine and can be highly influenced by results presented first (Pan et al., 2007), showing bias for these, and viewing them as more relevant, even if they are not (Keane, O'Brien & Smyth, 2008).

Google search results could indicate what is popular, influential or even accepted as fact by most. A Google search for "good design" presents Dieter Rams' Principles of Good Design within the first page of results while "Principles of Good Design" brings an entire page of similar results. Some popular blogs/articles/websites/features on design appear to hold Rams Principles as the standard for qualifying good design (Rosenfield, 2012; Weyenberg, 2016; Labarre, 2018), with one site noting that, "These principles specifically relate to his expertise in product design, but can be relied on as the foundation for modern, effective design in any discipline." (Croft, n.d.). Conversations have revealed that some Caribbean designers have also adopted a philosophy and practice based on Rams' Principles of Good Design.

These observations raise some questions: Are Rams' Principles for Good Design to be accepted as universal? Can design solutions be regarded as "good" if they do not meet those Principles? Is the adoption of the Principles exclusionary to Caribbean design? Based on research from The Helsinki Design Lab, Irwin notes that, "Design: As a Third Culture sits between the two poles of science and the humanities and is at the heart of questions related to feasibility, viability and desirability." (Irwin, 2015). Given the pervading sense of shame and embarrassment around culture and heritage, (Ministry of Community Development and Culture, 2010), can proposed Caribbean design principles encourage culture-proud, feasible, viable and desirable solutions?

4.4 Ram's Principles and Caribbean Design

Rams' Principles for Good Design, captured in Figure 5, are not all relevant to the needs, values and expressions of the diverse people and cultures of Trinidad and some other Caribbean islands. For example, Rams proposed that good design is "unobtrusive", "long-lasting" "aesthetic" and "as little design as possible". "Unobtrusive" is described as being "neutral and restrained" ("Good design |

About Vitsœ | Vitsœ", 2018). However, this principle seems at odds with the bright, assertive, even gaudy, colours of many Caribbean flags, clothing and signage.

The bold flavours of many ethnically based dishes tell the story of a people who cannot be characterised by the neutrality or restraint that is characteristic of many European societies that may value design that is “unobstrusive”. Some may consider the colours, larger-than-life presence and grandiose costume design of Moko Jumbies and Blue Devils at Carnival to be obtrusive (see Figure 6).

The temporary bamboo bending structures seen in Felicity, Trinidad at Divali are not “long-lasting” or timeless, though they are fit for their purpose. Similarly, the rich, intricately detailed colours and patterns in the design of deyas and clothing during Divali, are not necessarily “as little design as possible” as the beadwork, sequins and embroidery are non-essential and the colours, volume and layers of fabric don’t exude “simplicity”. These intricate details and decorative elements do not suggest “less is more” but “more is more desirable” (see Figure 6).

Rams proposed that good design is “aesthetic”. This can pose a challenge to Caribbean design if understood in relation to aesthetic theory in European philosophy (Folkmann, 2010), being “a class of judgments that also includes judgments of daintiness, dumpiness, delicacy and elegance” (Zangwill, 2014), and, as is more common, a concentration on “the study of the various forms of art and of the spiritual content peculiar to each” (Munro & Scruton, n.d.).

Given the socio-economic history of the Caribbean, with a people largely descended from slaves, servants, labourers and poor immigrants, transported to a New World without an aristocratic class of their own or a philosophical study of art and beauty throughout Caribbean history, and a perception of beauty heavily influenced by lower-income classes, a true Caribbean “aesthetic” may be impossible.

Judging by Rams’ widely accepted principles, unless a European aesthetic is adopted (good design is aesthetic), cultural expression is subdued or erased (good design is unobtrusive and long-lasting) and European values embraced (good design is as little design as possible), a Caribbean designer may conclude that his/her design solutions can never be good, even if they are feasible, viable, and desirable. There is a need to attempt to identify principles of good Caribbean design in order to recognise, value and encourage its practice and reap the benefits of an innate, collective understanding and pursuit of good design. This could be beneficial for Caribbean design and development, just as the understanding and adoption of Rams’ principles have been invaluable to European and even global design practice.

10 PRINCIPLES FOR GOOD DESIGN

AS PROPOSED BY DIETER RAMS

1. GOOD DESIGN IS INNOVATIVE

The possibilities for innovation are not, by any means, exhausted. Technological development is always offering new opportunities for innovative design. But innovative design always develops in tandem with innovative technology, and can never be an end in itself.

2. GOOD DESIGN MAKES A PRODUCT USEFUL

A product is bought to be used. It has to satisfy certain criteria, not only functional, but also psychological and aesthetic. Good design emphasizes the usefulness of a product whilst disregarding anything that could possibly detract from it.

3. GOOD DESIGN IS AESTHETIC

The aesthetic quality of a product is integral to its usefulness because products we use every day affect our person and our well-being. But only well-executed objects can be beautiful.

4. GOOD DESIGN MAKES A PRODUCT UNDERSTANDABLE

It clarifies the product's structure. Better still, it can make the product talk. At best, it is self-explanatory.

5. GOOD DESIGN IS UNOBTRUSIVE

Products fulfilling a purpose are like tools. They are neither decorative objects nor works of art. Their design should therefore be both neutral and restrained, to leave room for the user's self-expression.

6. GOOD DESIGN IS HONEST

It does not make a product more innovative, powerful or valuable than it really is. It does not attempt to manipulate the consumer with promises that cannot be kept.

7. GOOD DESIGN IS LONG-LASTING

It avoids being fashionable and therefore never appears antiquated. Unlike fashionable design, it lasts many years – even in today's throwaway society.

8. GOOD DESIGN IS THOROUGH DOWN TO THE LAST DETAIL

Nothing must be arbitrary or left to chance. Care and accuracy in the design process show respect towards the user.

9. GOOD DESIGN IS ENVIRONMENTALLY-FRIENDLY

Design makes an important contribution to the preservation of the environment. It conserves resources and minimizes physical and visual pollution throughout the lifecycle of the product.

10. GOOD DESIGN IS AS LITTLE DESIGN AS POSSIBLE

Less, but better – because it concentrates on the essential aspects, and the products are not burdened with non-essentials. Back to purity, back to simplicity.

Figure 5 - Rams' Principles of Good Design. Photo source: Author. Content source: https://www.vitsoe.com/us/about/good-design

Figure 6 - Moko Jumbie (left) Photography: Maria Nunes Source: http://www.discovertnt.com/welcome/calendar/maria-nunes-_carnival_tuesday_277/#axzz4yObb9HEn; Blue Devils (centre) Photography: Maria Nunes Source: http://www.marianunes.com/p848144346#h3a5ee267; Divali Clothing (right) Source: http://www.meppublishers.com/content/index.php/remembering-divali-in-felicity-trinidad/#axzz4yOnWWSUS

4.5 Caribbean Design and Policy

Design's core focus, often applied through varying design disciplines, is addressing problems and providing human-centred solutions. This may be done, for example, through the design of structures and spaces (e.g. in architecture, urban and interior design); goods and products (e.g. in fashion, industrial and product design); and services and experiences (e.g. in graphic, user interface and experience design). Design strategy and thinking can harness the methodology of designers, often in ways that are holistic, practical, human-centred, creative and visually driven to address social, environmental and other problems. Naiman notes, "A design mind-set is not problem-focused, it's solution focused and action oriented towards creating a preferred future." (Naiman, 2017). Press and Cooper propose that "If one considers designers as those people with the skills to innovate, to solve problems, to bring creativity to a situation, with an element of visualisation ability, and with the ability to deliver a product, then wherever there is a need to do this, designers can turn their hand to it." (Press & Cooper, 2003, p.195). This does not suggest a superior position for design but emphasises the need for understanding design's value, scope and potential to reap greater benefits in the Caribbean. Nigel Cross speaks about the close relationship between design, science and art, establishing each as different yet essential to human intelligence *(Cross, 2010)*. Considering design as distinct from the arts and identifying principles of good design for Caribbean culture could inform policy development and prove valuable.

4.6 Design and Art

Design is often overlooked in Trinbagonian and Barbadian cultural policy or, perhaps, assumed to be addressed within the Arts. This is problematic. Confusing art and design can be crippling to design and its optimum functioning in Caribbean societies. Industrial designer and educator, Sir Misha Black noted, "At their extremities of maximum achievement art and design are different activities sharing only creativity and some techniques in common." Black noted the criticism of an art student regarding the art in London galleries as "a luxury of the bourgeois elite…" and added, in reference to conceptual and performance artists, that "Support for it comes not from the masses which it attempts to reach but from the bourgeoisie which it purports to despise." (Black & Blake, 1983, p.216).

When Caribbean design is confused with art, the result can be a design industry that is inaccessible to the masses; disconnected from providing feasible and viable solutions to local problems; and heavily dependent on the local upper-class, diaspora in the developed world or an ideal, wealthy foreigner. The effect of this can be a dependence on imports; limited innovative responses to local needs; exclusion of the local retail market; a lack of affordable, utilitarian solutions; a trinket-based design industry; a high cost of investment to train persons to design for a market with standards and

expectations with which they are not familiar; and the economic repercussions of a design industry that lacks diversification. Design should be recognised and treated distinctly from the arts in the development of policy in order to capitalise on innovative opportunities for growth. Given these possible effects and the socio-economic history of many Caribbean islands, design that is accessible to locals, solution-seeking, necessary and appealing should be especially valued by people and policy-makers.

4.7 Design and Craft

Confusing craft with design can be similarly problematic. A "Craftsman" is "1. a person who practices or is highly skilled in a craft; artisan. 2. an artist." (craftsman. (n.d.), 2017). "Handicraft" is "1. manual skill. 2. an art, craft, or trade in which the skilled use of one's hands is required..." (handicraft (n.d.), 2017). This suggests that craft may focus on the mastery of techniques and methods of making, often resulting in beautiful artefacts, objects, materials or goods. Good craftsmanship speaks to perfection while good design speaks to purpose. Regarding perfection and purpose, Black notes, "Perfection without purpose can be as negative as purpose without perfection, but if we lose the will to make as perfectly as we can all is certainly lost and nothing gained." (Black & Blake, 1983, p.216).

Excellent craftsmanship dictates that an object be made well; craftsmen may dedicate long hours to their work resulting in objects of great intrinsic value which, like art, can come with a dependence on the local upper class, diaspora in developed countries or wealthy foreigner. Many of the issues that may be encountered when art is confused with design may also be encountered when craft is confused with design in policy development and practice.

All craftsmen are not designers and all designers are not craftsmen. It can be observed in both Trinidad and Barbados that while some craftsmen have mastered skill, they are not designers and may struggle to innovate or create items that are desirable to an international market or wide cross-section of local people.

Similarly, while some designers have the ability to conceptualise and model desirable items, they may lack the skill to make well or quickly with traditional resources that the craftsman has mastered. While all craftsmanship should not necessarily be replaced with technology and imports, it may be naive to ignore these. Design can take advantage of technology, programmes and machinery in creating and mass-producing affordable, useful, desirable solutions that are culturally relevant. Black notes that, "If a designer is not competent to resolve the technical as well as the social and formal aspects of a problem he is purely a stylist concerned only with the superficial appearance of products the manufacture of which is beyond his comprehension." (Black & Blake, 1983, p.237). This does not suggest that the Caribbean designer is to be replaced by the engineer or technical operator. Far from! Robert Boguslaw cautions that

> *"Perhaps the fundamental danger in any system design is the possible loss of desirable aspects of "humanness." To avoid this danger, it is necessary to find means for insuring that the systems themselves somehow retain these qualities. If the design specifications are deliberately shorn of everything but a callous rationality, we feel uncomfortable without being able to specify why." (Boguslaw, 1965, p. 159).*

There is room for policies to be developed that encourage the application and practice of good design by encouraging the inclusion of designers in the manufacture of Caribbean goods and products.

Caribbean goods, by necessity, should be environmentally conscious and responsible. The 2017 hurricane season that battered numerous islands is "one of the worst on record" (Harrington & Gould, 2017). With rising concerns about climate change and the fate of many small islands, policies that support the design of products, solutions and processes that mitigate global warming, adapt to climate change or otherwise benefit/avoid harming the environment may be essential. Considering

design in craftsmanship, manufacturing and business strategy can address challenges regarding sustainability, modern appeal/desirability and relevance.

5 Proposed Caribbean Principles of Good Design

This paper proposes five fundamental principles to help qualify and support good Caribbean design. Eurocentric design principles are not always relevant for Caribbean people and culture with its melting pot of ethnicities, influences, historical context and needs of people. What is feasible, viable, desirable and good design in the Caribbean may be different from what is widely recognised as good design. An analysis of Megatrends that are currently shaping the world (The Upside of Disruption: Megatrends Shaping 2016 and Beyond, 2016) suggests that human-centred, independent designers who embrace technology and seek the good of people and planet have a significant role to play in building a better world. A growth-focused ideology should therefore facilitate the success of individuals and projects that do just this. A set of recognised principles for good Caribbean design can help inform policy thereby facilitating the growth and success of valuable initiatives and projects.

The proposed principles for good Caribbean design, outlined in Figure 7, are based on a Caribbean perspective and cultural context.

These are -

1. Accessible - Attainable for the average income earner and/or easily accessible to local and/or diaspora markets
2. Urgent - Solution-seeking or attempting to address problems, needs or make improvements that can benefit people or planet
3. Sustainable - Profitable, safe, feasible and environmentally conscious, minimising environmental, physical and visual pollution, harm or waste
4. Appealing – A considered interpretation of local values with meaning expressed and ideas reflected or communicated through design application or in function as various senses are engaged (partially based upon “Evaluating Aesthetics in Design: A Phenomenological Approach” (Folkmann, 2010).
5. Relevant - Significant to the traditions and values of Caribbean heritage while considering continued relevance in a rapidly changing, globally connected world.

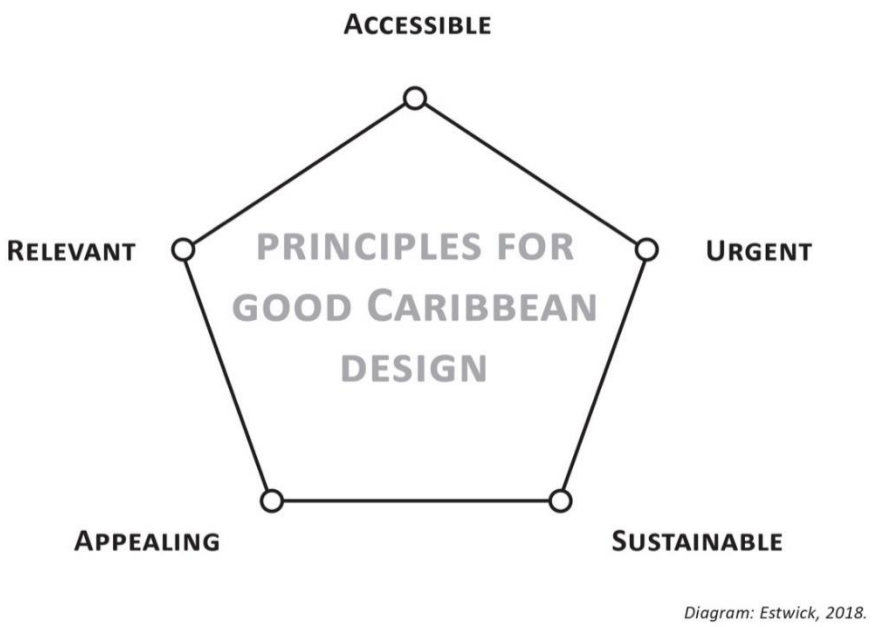

Figure 7 - Proposed Principles for Good Caribbean Design

6 Design and Culture: A Synergistic Relationship

The following case studies exemplify the proposed principles at work in local, culture-focused projects, by designers, that have led to design solutions that provided social, economic, environmental or technological benefits.

6.1 Fete Signs & De Sign Books

De Sign Books, a project and product of Collaborative Laboratory,[1] initiated by Barbadian-born designer Debbie Estwick, creates notebooks from out-dated fete/party signs to celebrate local culture, up-cycle waste and showcase possibilities for innovation through design collaborations.

6.1.1 Opportunities & Challenges

Sign-painting and informal promotions contribute significantly to Trinidad's cultural and physical landscape. Bruce Cayonne is a Guyanese-born local designer and sign producer who practices the typography-based craft of hand-painted promotional signs despite the prevalence of printed banners. His colourful, cost-effective hardboard signs can be spotted along highways and main roads using local lingo and promoting fetes (parties), musical artistes, food establishments and other businesses (see Figures 8, 9). His signs may be a design solution in response to the need for affordable and effective public communications.

The colourful signs capture a distinctly Caribbean language and visual style and represent a class of sign-painters that, according to Cayonne, has been declining over the years. However, there is an inherent challenge in the sign painting and informal promotions system when it comes to removing signs that are past their date. Event-planners, sign painters, promoters and sign installers all play different roles but no one currently has the role of sign removal. This can result in visual clutter and physical debris along public roads.

Figure 8 - Bruce Cayonne Signs: Cutters (left) Source: https://www.instagram.com/p/BSO_dSGhBSI/ & Big People Party (right) Source: https://www.instagram.com/p/BSLjtWiBGV_/

[1] Collaborative Laboratory (Co. Lab.) is an experiment to drive innovation through design collaborations, connecting design practice and thinking with everyday individuals, businesses and organisations through small projects and experiments.

Figure 9 - Bruce Cayonne Sign: We Doh Business Source: https://www.instagram.com/p/BQaoB1dgwqj/

6.1.2 Design Response

Up-cycled sign books, made with recyclable newsprint paper, become a missing link in the event promotion system by placing value on out-dated signs, securing their removal, giving old signs a second life and providing additional income-earning opportunities, all while commemorating events, celebrating and promoting local culture.

Design thinking is used in implementing a system involving and compensating the sign painter or promoters in sourcing used signs. Designed to lay flat when open for optimal usability and priced affordably in comparison to other handmade books, De Sign Books feature rugged, hand-painted, one of a kind covers that highlight the colours and energy of Caribbean living through carefully selected, abstract shapes. The brand is nuanced in both its design and naming (see Figures 10, 11).

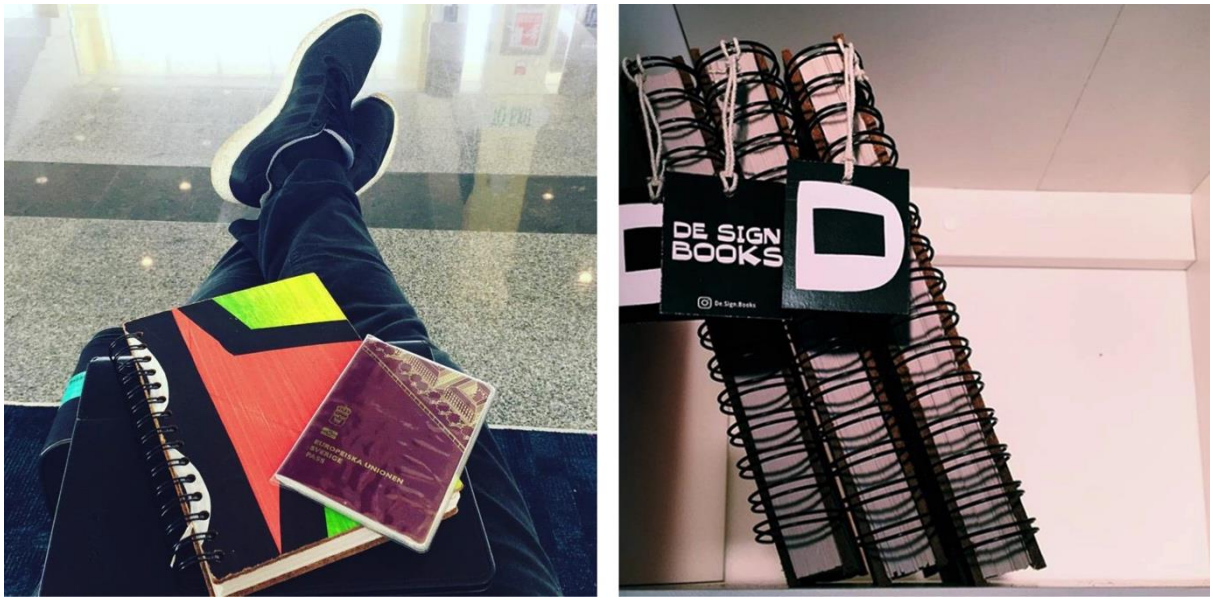

Figure 10 - De Sign Books with Customer (left) Source: https://www.instagram.com/p/BOP3WB3A15s/?taken-by=nicholashuggins & De Sign Books Branding (right) Source: https://www.instagram.com/p/BNKtmHmFD1x/?taken-by=designerisland

Figure 11 - De Sign Books Product Shots Source: Author with photography by Kibwe Brathwaite

6.1.3 Results

De Sign Books retailed at two outlets in Trinidad and one independent stockist-reseller in North America. Social media posts on Instagram and Facebook along with a web page and a bitcoin shop were developed for the project to aid in product promotion and accessibility.

De Sign Books saw the support of a local and international community around the product and growing interest around sign painter Bruce Cayonne who, through the help of Trinidadian designer, Kriston Chen, is on Instagram and accepting online orders for signs. Members of the diaspora reached out through social media, webpages and online forms to engage about the project, pursue partnerships and purchase books or signs. Books and signs now reside with people locally, regionally and internationally, in Barbados, the UK, USA and other countries.

6.1.4 Design Principles at Work

In the case of fete signs and De Sign Books, the proposed Principles of accessible, urgent, sustainable, appealing and relevant were embodied in the design solutions. The projects showed aspects of design thinking, graphic design, product design and craftsmanship. Design contributed to language preservation with the use of dialect in both signage and branding. The work of Cayonne and De Sign Books were culturally situated and celebratory of bright colours, characteristic of the Caribbean; “cheap” or “budget-friendly” sign/book materials; and hand-painted letterforms that characterise the “make do” signage solutions. The sale of De Sign Books to members of the diaspora contributed to foreign exchange. The making of De Sign Books provided environmental benefits by using old signs that could otherwise become garbage or litter. In addition, it highlighted opportunities and created solutions to help counter possible negative effects of the cultural practice of sign painting, which is sometimes prevented as it is not always environmentally friendly. By addressing the possible negative effects of a cultural practice and providing a solution, design worked to contribute to cultural continuity.

6.2 #1000Mokos & Moko Jumbie Institute of Higher Learning (MJIHL)

Afro-Caribbean stilt-walking (Moko Jumbie) adopts a new approach to co-learning, adaptability, accessibility, community, continuity and online promotion.

6.2.1 Opportunities & Challenges

In Trinidad, Moko Jumbie groups and masters teach, perform and progress the practice of the cultural art form of walking/dancing on stilts. Geographical communities around masters and teaching spaces gain the benefit of exposure to stilt dancing. Learners may use a stilt that is attached by wrapping the foot and shoe of the wearer to the stilt or by use of a custom stilt that has the learner's shoe bolted in, thus creating inconveniences and challenges in trying or sharing stilts. Limited access to experimenting with stilts to learn outside of established schools and communities along with challenges in affordable, autonomous, easily adaptable and accessible stilts leaves a gap for designers to problem solve through a branded system of easily accessible and shareable stilts, informal gatherings, exploration, experimentation and co-learning.

6.2.2 Design Response

The design of a quick-release stilt, popularised by the Moko Jumbie Institute of Higher Learning (MJIHL), a concept of Canadian-Trinidadian architectural designer, Michael Lee Poy, provided learners with an easily shareable stilt that encouraged autonomous learning. Made of pine, plywood and aluminum, the stilts which featured steel D-loops and velcro closures, were designed for comfort and convenience. Lee Poy collaborated with Sam Mollineau of Callaloo Company to design and fabricate the quick release system (Estwick, 2017).

Need precipitated the design of the quick-release stilt. According to an article by Debbie Estwick on Designer Island, a website dedicated to design and creative culture in the Caribbean, Lee Poy said of his design impetus, "I want to make a better stilt, a light one... I want to support better costuming and a better mas" (Estwick, 2017).

The quick release stilts, originally used to teach primary school students, facilitated the development of the #1000Mokos initiative in Trinidad (see Figure 12).

#1000Mokos began as a co-learning initiative where people from any community could try stilt-dancing in a variety of spaces, disconnected from a single community space or school at no cost, though donations were accepted. Initially spearheaded by Trinidadian graphic designers Kriston Chen and Joshua Lue Chee Kong, the group evolved into a thriving community of volunteers and supporters to facilitate stilt dancing activities and practice sessions (see Figure 13). Sessions were held at Alice Yard primarily, a contemporary art space, but locations included Audrey Jeffers House, in honour of International Women's Day, a late Victorian house built by the first black resident in St. Clair (Noel, 2011); Las Cuevas Beach and Wildflower Park, among others. Designed social media and online promotions were used to promote new events, form an online community and document coverage of events (see Figure 14).

Figure 12 - Quick Release Stilts Source: http://designerisland.com/stories/designing-for-moko with photography by Kibwe Brathwaite.

Figure 13 - Local and international participants at Alice Yard along with members from Touch D Sky, Moko Jumbie group (left), Photographer: Arnaldo James. Source: https://www.instagram.com/1000mokos/ and at Audrey Jeffers House (right)

Figure 14 - Instagram location Fon posts designed by Kriston Chen and Joshua Lue Chee Kong Source: https://www.instagram.com/1000mokos/

6.3 Results

#1000Mokos served as an equaliser for people of all ages and races, from a variety of local and international places (see Figure 15).

For many, an interest in Mokos was kindled or rekindled. Designers developed solutions to make the culture and art form accessible and generate new interest. That growing interest was seen from

unlikely sources, including locals and tourists who were previously disconnected from the existing groups and communities that continue the tradition. While the initiative depended heavily on the selfless generosity of many individuals, opportunities for revenue generation to offset expenses were capitalised on through the sale of quick-release stilts and the design and sale of #1000Mokos T-shirts along with the promotion and hosting of paid learning sessions in collaboration with pre-existing, traditional groups (see Figure 16, 17).

Figure 15 - Mokos of all ages (left) Source: https://www.instagram.com/1000mokos/; (right) Photographer: Kriston Chen. Source: https://www.facebook.com/photo.php?fbid=10159832936635253&set=oa.311251866053192&type=3&theater Photographer: Shaun Rambaran

Figure 16 - Mokos T-shirts. Designed by Richard Mark Rawlins. Source: https://www.instagram.com/1000mokos/

6.3.1 Design Principles at Work

In the example of #1000Mokos and MJIHL, the proposed Caribbean Design Principles of accessible, urgent, solution-seeking and relevant were embodied. The projects showed aspects of design thinking, graphic design, product design and social design. These projects both contributed to cultural continuity, along with heritage pride and social and racial integration through accessible stilt

dancing. Design made a significant impact in providing a sharable stilt that was easy for an individual to put on or take off. This precipitated the creation of #1000Mokos, a roaming community. As an inclusive community, #1000Mokos engaged with other Moko Jumbie communities, hosted events, engaged young and old of varying races and socio-economic backgrounds and created an online hub and community for Moko Jumbies, aspiring Mokos and fans.

Figure 17 - #1000Mokos Masterclass with traditional group, Two Brothers (originating from the Keylemanjahro Group), at Big Black Box. Hand-painted signs from Bruce Cayonne brand the space with distinctive Caribbean flair. Crossing signs help Mokos across busy Port of Spain streets. Photographer: Jason Hunte. Source: https://www.instagram.com/1000mokos/

7 Conclusion

Fete signs, De Sign Books, MJIHL and #1000Mokos show that design can profitably address local social and environmental challenges while promoting and celebrating culture and that design can fuel popular interest in cultural traditions, increase accessibility, foster social growth and integration and improve technological growth.

Identifying, proposing and embracing a set of principles for good Caribbean design could help improve confidence and pride in national heritage, identity and design solutions, while providing a benchmark for recognising and valuing good design. Including design in policy development could help Caribbean island nations capitalise on the specific benefits of design, as different from art, craft or engineering, and reap the rewards of promoting, fostering and funding the practice of good Caribbean design. This can lead to the following: development, sale, engagement and export of cultural products and experiences and that are inclusive, accessible and affordable for locals; perceived as appealing to locals, the diaspora and internationals; urgent and necessary for addressing problems and relevant to preserving the past, progressing traditional approaches and embracing the future.

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Sustainable Fashion Practices in the Soviet Union?

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This paper addresses various research issues regarding the (non-existent) fashion industry and aspects of sustainability in meeting citizens' everyday needs in the Soviet Union. Why was the Soviet fashion industry struggling? How did the Soviet citizens acquire the necessary apparel? What sustainability ideas could be found in the society's interpretation of fashion? What can be learned from the Soviet DIY subculture? The research was done using a combination of qualitative and quantitative methods, including the artistic research method. Researching the relationship between the Soviet worldview and fashion, one can argue that the fashion points out the bipolar disorder of the USSR system, as fashion precisely reflects what is happening in society. The next logical steps forward in the research on the topic would be a more thorough and targeted research of the DIY sustainable practices in Soviet Union.

Soviet Union, fashion, sustainability

1 Introduction

Soviet fashion industry existed in a distinctive theoretical parallel universe completely different from citizens' everyday needs and apparel. Doing research on the relationship of the Soviet world and fashion one can argue that the fashion accentuates the bipolarity of the Soviet system, as it precisely reflects what is going on in society. On the one hand, there was a fashion world with the 'houses of models' and fashion shows, boutiques, shops, but it existed in magazines, fashion spectacles abroad, and statistical data. On the other hand, private tailors, DIY, ateliers, workshops, movies, forbidden magazines and profiteers made the real living Soviet fashion.

The bipolarity of Soviet Union manifests itself even nowadays. In interviews with former Soviet citizens who were at their life's peak during Soviet times one can clearly see the dualism in answers. The answer starts with one claim, but in the middle the person suspects the canting over of the subject, corrects herself and finishes with a nice touch. On the question on the respondent's thoughts about Soviet fashion as a whole the answer was:

> *Soviet fashion was democratic, mostly re-sewn and handmade. Ateliers had long waiting lists, it was possible to order leather shoes and one could buy high quality leather shoes,*

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not like today. And evening garments were made in such intricacy, one could enjoy them for years! (Gotsouliak 2015)

Nevertheless, Soviet Union had the largest state-owned fashion industry in world. There were working thousands of professionals, designers, constructors, artists, fashion theorists. According to planning economy there was a large-scale mass production of apparel and accessories (Gronow and Zhuravlev 2016, 10). Interestingly, the world's largest fashion industry kept fighting against materialism and recycling of old and pre-used items "from generation to generation" (Tihomirova 2015). Soviet Union was using fashion as an instrument to prove the possibility of communism in the whole world, to prove that planning economy is more capable of creating high-quality fashion for everyone than capitalism and democracy, but bureaucratic limitations and nonconformity of planning economy were imminent obstacles.

To understand the do-it-yourself mechanisms in the Soviet world it is necessary to examine the fashion industry as a whole and to inspect more closely what was happening in households. Scarcity of the garments and accessories made people apply creativity and imagination to acquire the requisites. After that, the next problem arose: how to repair the broken parts of clothing, and what to do to replace the completely broken shoes?

1.1 Methodology

The paper originates in the author's own artistic practice, as the author used some of the materials on Soviet fashion in designing her fashion collection, to conceptually solve the problems occurring in the analytical process. The model of artistic research was used: subjectively selecting geographical coverage, specific areas of interest, cross-references.

Another method used in researching for this article is historiography. The double standards and propaganda of Soviet Union must be checked with oral narratives to acquire a more complete representation as they both reveal slightly different aspects of the same symbolic reality.

The main focus is on a specific period of time and place, 1960s in Soviet Union, on what people wore and on the main events influencing the fashion. The quintessential aspect of this article is verbal narrative, interviews with people who lived in this period. Conducting interviews was necessary to prove well-known mythological narratives. There were 29 respondents of which 1 was male and 28 female respondents. The aim of the interviews was to obtain evidence about fashion, do-it-yourself ideas and sustainability in Soviet Union. It all comes down to triangulation (Gaimster 2011, 7). The research methodology in preparation of this paper included processing and analysis of the relevant literature, peer-reviewed research papers, historical books, databases, photographs, and documentaries.

2 The Great Expectations of Soviet Fashion Industry

The beginning decade of Soviet Union was conceptually different from the preceding or following decades. The first Soviet 'must-haves' – the commissar leather jacket and leather hat – were popular among male and female citizens alike (Papkova 2007). There were a lot of talented artists captivated with the idea of Communism, designers working in avant-garde and constructivist styles, with experimental and innovative ideas. The fashion itself as concept was declared a useless part of the capitalistic culture. Avant-garde fashion experiments by Vera Mukhina (fashion design and advice), Vladimir Tatlin (workers apparel), Ljubov Popova (sports apparel), Varvara Stepanova (constructivist textile patterns) were fresh, exciting, constructive and practical, designed for mass production. Their experiments were trying to merge art and everyday life (Wolfe 2013).

Figure 1. Mukhina, Vera. Sketch for everyday fashion, dress made from towels. Source: Strizhenova, T. History of Soviet Costume, Moscow, Советский художник, 1972

In late 1930s the first 'houses of models' started to emerge (Gronow and Zhuravlev 2007). The Moscow House of Models was the first, opened in November of 1935 (Bartlett 2010, 71). Its first printed issue in 1936 was presenting two ways of achieving the Soviet style of dress. On the one hand it was an independent and creative approach on the subject inspired by ethnographic clothing of various Soviet nations. On the other hand, there were attempts to critically analyse and reconstruct the technical elements from the Western fashion industry to produce apparel industrially (Bartlett 2010, 72).

The basis of planning economy was laid in 1930s during the stage of collectivization and nation-wide industrialization. The principles of planning economy remained invariable till the collapse of Soviet Union (Gronow and Zhuravlev 2016). The demand for apparel was rising especially in the post-war years, as people wanted to forget the horrors of war. As a result of lacking most necessary commodities during war years, expectations were high (Gronow and Zhuravlev 2016, 57). It was decided to develop new guidelines for the sector of light industry. The Stalinist myth was not familiar with such categories as 'average' or 'mediocre'. Mass production should have repeated the appearance of luxury prototypes as seen in Soviet fashion magazines (Bartlett 2010, 84). Nevertheless, the mass production was struggling till the end of 1960s because of its incapability to satisfy the basic needs of citizens (Tihomirova 2015).

The ideal of mass production was very simple: the best fashion designers from Soviet fashion houses working to create new garment designs – the best in the world. Packages of finished designs would include patterns, sizing, technical specifications, desired fabrics, buttons and fittings, which would be transferred to production factories fulfilling government orders to promptly supply the USSR with modern clothing. Government-controlled light industry would quickly eradicate old and threadbare garments, and the Soviet citizen would permanently show off in new, fashionable designer clothes. Soviet government would monitor citizens' style to become more politically correct, predictable, close to an aesthetical perfection, medicinally and climatically suitable and convenient. It would completely eradicate the desire for the fashion beyond the Iron Curtain (Bartlett 2010, 84). But this never came to be.

By the year 1948 there were fashion houses in Leningrad, Minsk, Riga and Kiev; afterwards, more than forty (40) were created, coordinated by the central All-Union House of Models in Moscow. Superior-qualification masters were trained in applied art secondary schools and light industry technical schools. Until 1960, the only two opportunities to pursue the higher education in fashion design were either the State Art Institute of Estonian SSR or the A.N. Kosygin Moscow Textile Institute (Priedola 2017).

Houses of models were supposed to be financed by mass-production industry commissioning and purchasing designs, but instead, sewing factories opted for production from existing well-known pre-

war patterns or own designs reproducing outdated and low-quality apparel (Lebina 2015). The fact that people bought out absolutely anything did not help the situation. Fashion houses operated with losses by offering the designs to factories for free, which later were used as inspiration for altering pre-war patterns 'to customize templates according to the requirements of contemporary fashion'.

The production of apparel underwent a lot of 'substitutions' affecting the quality. The garment that reached the distribution centres was reproduced in a hundred thousand copies and shared almost nothing with the fashion drawing or with the prototype designed for the textile company by the house of models (Bartlett 2010, 85). It turned out that constructing and developing specifications was one thing; it was entirely another level of complexity to tackle the production of the non-alternated prototype.

When working for production requirements, the design process was strictly regulated: even the exact amount of threads and fabric was calculated to the last millimetre. Designers should be aware of the complexity of the prototype production process. Production technology significantly limited the artist's creative ideas, as even the slightest deviation from fixed standards was not acceptable (Priedola 2017).

Fashion actually did not exist in the Soviet Union (Huber 2015) or if it did, it never reached the consumer. Terrible colours and shapes of clothing in shops, an unfortunate measurement system, the eternal deficit of goods – all the problems pointed to that (Stankevica 2015). The houses of models were lacking collaboration partners, the production industry was short of supplies and raw materials, the planning organisation was ineffective and distribution was very tardy. All the affected parties lacked feedback from the consumer: from trading and distribution, to production and to the houses of models.

It was decided to develop a collaboration between the 'ateliers of individual tailoring' and the houses of models. The collaboration between those two institutions was forming poorly. Ateliers were working under supervision of their own artist's designs, inspired by foreign fashion magazines or individual needs of the clientele; the guidelines of the house of models were not relevant (Zaharova 2007, 58). The ateliers inside the houses of models were an exception: they developed and produced the collections, organised fashion shows and received individual orders (Donskaja 1967). The Soviet citizen visited ateliers quite seldom, only for special occasions; he brought himself the fabric, fittings and buttons; the design was the result of mutual efforts, and the process was time-consuming (Maskova 2015). Thus, the atelier became a source of fashion trends not controlled by the Soviet government (Huber 2015). The process of the commission of garment was very impressive. Designer-cutter Anna Priedola shared her memories on the schedule of the process:

> *Receiver called upon the designer-cutter of the shift, specialized in production of such garment. Designer according to dialog with the client practically invented and draw the design. The main question was on the design of sleeves – raglan, sewn-in, kimono or combination: kimono in back, sewn-in up front. The production team consisted of designer-cutter, six sewing masters and the brigadier. The cutter worked with the USSR unified construction method – constructing patterns directly on fabric and bypassing the patternmaking process. The brigadier supervised the sewing process and evenly distributed the work according to the skills of sewing masters. The brigadier also cut the lining and batting cloth for coats and suits. Designer-cutter had to provide up to 60 coats, and each custom-made garment had to be fitted twice. Receiver also wrote the receipts and cashed in the payments for ready orders. When the order was fully paid and taken out from the atelier it was counted as finished and was recorded in the accomplished work plan (Priedola 2017).*

After encountering defeat in light industry segment, houses of models became a peculiar institution of Soviet fashion. They started specializing in analysing and forecasting international fashion trends, and developing the theoretical basis of Soviet fashion, taste, wearing instructions and propaganda

(Zaharova 2007, 60). There was a small amount of fashion design and patternmaking for individual sewing as well. The head protocol remained intact: not to copy designs from international fashion magazines, but to develop own models by interweaving the artist's idea with skills of patternmaking and modern production technology (Gronow and Zhuravlev 2007).

The idea of mass production of affordable clothing and furniture a.k.a. 'fast fashion' emerged all over the world almost concurrently. Mass production in the Soviet Union started around mid-1930s. In capitalist countries, the first fast-fashion label H&M was founded on 4 October 1947, and the first affordable furniture brand IKEA appeared in 1943. Curiously, both brands originated in Sweden. Comparing state-funded and private-capital mass production – one in a totalitarian regime and another in a democracy – it is obvious that a utopian (in this case rather a dystopian) vision can flourish in a free society: H&M and its followers are still thriving in the global mass market today.

Confronting the Soviet Union's fashion industry with Jean Baudrillard's concept of simulacrum, one could see an obvious resemblance between them. The fashion industry seemed real from the distance, but when looking closely, it was nothing more than a weird construction replacing reality with its representation.

3 The Hunting and Gathering for the Necessary Apparel

Nevertheless, Soviet citizens felt the need to be dressed in something, preferably in clothing which preserved their self-respect – not necessarily up to date or trendy. The greater part of apparel was home-made: sewn or knitted by hand, including restoring, mending and re-sewing.

During the interviews on Soviet fashion respondents dwelt on the topic of gathering the necessary apparel. 66 percent remembered the purchase of fabrics, materials and patterns, 62 percent were purchasing ready-to-wear garments in shops. Significant part of women, 42 percent, were ordering some apparel in ateliers. Divided equally in three groups – 15 percent each, respondents remembered sewing themselves, commissioning the work to private sewing masters, or re-sewing ready garments at special ateliers or themselves.

For example, one of the respondents remembered her mother sewing everything: "All the clothes were sewn by my mommy and I was humble and grateful for it. I regret I haven't learned the skills from my mommy. It was hard to get good fabric and all the patterns were inherited from my mommy's mommy" (Cekula 2015). 28 percent of all were buying clothing and accessories by '*blat*' (illegal and corrupt deals) or in 'commission' (second-hand) shops. Houses of models were a less popular place to gather the apparel – only 14 percent, as well as dealing with '*fartsovshiki*' (purchasing foreign or rare items illegally from private persons) – 7 percent.

Analysing the acquired data, one could construct a few theories. The numbers have a distinct value, even excluding the subjectivisms and unreliability of memories. The free form of questions and the time distance, separating the interview from the researched time period, allow choosing the desired answer, the most 'appropriate' one. To eliminate such pattern, the questionnaire repeatedly included questions on the particular subjects phrased differently.

Which activities remained in memory the most: purchasing the fabric or sewing by themselves? Maybe it was the visit to the ready-to-wear shop? Or the visit to the private sewing master? Today's perspective gives only a vague idea of the reality of situations. Many of the respondents remembered small and intricate parts of attire such as "tennis shoes must be chalked so white they emitted white dust clouds when walking" (Buravcova 2015) or special materials, textures or prints such as "light moss-green coloured half-knee high boots with silver hardware and lace-up details along the front and greyish-white rough wool fabric long sleeved and closed-cut coat-dress with black spots, metallic belt and brooch" (Stankevica 2015).

The answers point out that the practice of sewing themselves or visiting the sewing masters was more widespread in the researched time period than it is today. It is clear that there was a

completely different retail typology, not based on business, but more similar to distribution stations. All the fabric production, distribution, apparel production economy and logistics were different in the planning economy.

The researched time period belongs to the industrialisation era of the Soviet Union, the boom of mass production. In combination with Soviet unitary controlled economy and its 'distribution' structures there were forming peculiar, economically absurd situations – low quality, deficit, illogically expensive or cheap items, limited supply or unexpected supply overflow of products of one sort ('the end of the month' phenomenon), etc.

The tradition to sew clothes themselves belongs to the beginning of the industrialisation and it would be well-founded to assume that in the research period it was declining. In 1950s – 60s sewing was the necessity of life, as undeveloped Soviet economy in post-war time could not manage the rising demand. 1970s came with certain 'abundance' of ready-made clothing, and individual sewing and ateliers services started to become more specialized and expensive.

Thus, it is possible that generalized and subjective memoirs of hunting and gathering have been constructed in opposition to 'today': the conditions of the last 20 years. Acquiring the apparel as well as food, or renovation of home, is only one of the many possible dimensions to remember from one's youth.

It is important to distinguish the phenomenon of the culture and guidelines of appropriate attire for the Soviet citizen. The topic had been discussed constantly in schools, in work meetings and in media. Those who did not fall under the authorized guidelines of allowed style were severely criticized (Briede 2015). Every book about sewing or knitting techniques contained introductory section to strengthen the morality of Soviet citizens, and to develop the appropriate taste. The women's magazines in Soviet Union were not about fashion or housekeeping, or even advisory. There were articles mostly about the life and thoughts of V.I. Lenin and party members, some propagandistic and moralizing stories and reports from factories or united farms. Two or three pages were dedicated to children and 'kitchen', questions of hygiene and nutrition, and quarterly pattern attachments (Padomju Latvijas Sieviete 1960, 18-22). Soviet women's magazines also contained small fashion-trends and taste sections discussing the correct length, fitting and neckline for garments (Ozola 2015). The housekeeping guide contained a special section on the topic of the culture of clothing (Latvijas valsts izdevniecība 1961, 483). The section on clothing of the Small Encyclopaedia of Latvian SSR addresses the subjects of 'moderation' and 'suitability' levels (Latvijas PSR Mazā enciklopēdija 1967).

The tasteful and sophisticated Soviet woman was fitting in the guidelines of 'suitability', 'simplicity, 'grace', 'modesty' and 'sense of measure' (Lobina 1958, 20-21). 'Moderation' was necessary to maintain in hairstyles, make-up and accessories. The Soviet standard of beauty was a clean, open face with pinned up wavy hair, no make-up, but with a sense of happiness.

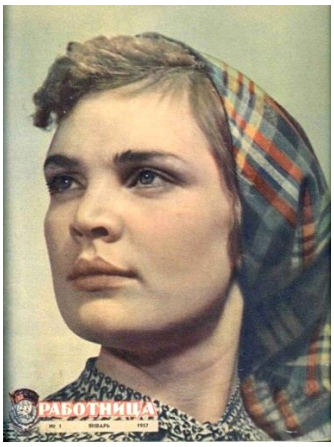

*Figure 2. The cover of Soviet women's magazine Работница (Rabotnitsa)**.** January, 1957*

The dream professions of such women are milkmaid, locksmith or truck driver. Intricate and expensive jewellery, furs and make-up were not appropriate for humble Soviet citizens (Lobina 1958, 21).

Gender inequality and stereotypes were a huge issue in Soviet Union (Hetherington 2015, 436). It is no coincidence that only male respondent agreed to be interviewed for this research. Emphasizing the gender inequality, the sole male respondent was referring to fashion topic as strictly 'female business'. The question about flashy and tasteless side of Soviet citizens' sense of style was answered as "not judging people by their clothes" (Lubarskij 2015), and by far one of the longest answers. Other answers rather contained as few words as necessary to reply on the subject.

People living in the Soviet regime often sought comfort in food, clothing, friendships, family, 'little' things, and alcohol. Peace and comfort were provided in soft flannel house-coats worn with warm woollen cardigans. There was the so-called home dress - very popular Soviet soft flannel (or cotton muslin for summer) wrap dresses with bright floral prints. Outstanding contrast was achieved by the LIFE magazine photographer Howard Sochurek, who was taking pictures of the first Dior fashion show models walking in Moscow streets in 1957. Soviet people and French models interacted with each other, and facial expressions of citizens show confusion and astonishment simultaneously.

The garment's length and openness was strictly regulated – whether it was a dress, skirt or costume, no shorter than 5 cm below kneecap. Armholes in summer and evening dresses had to fit tightly around the armpit joint, small sleeves or 'wings', miniature décolletage were more preferable (Padomju Latvijas Sieviete 1960, 22). Pants or pant suits were not appropriate for women, nylon stockings were frowned upon, as well as tight-fitting and shape-accentuating dresses and high heels (Adamoviča 2015).

The subject of bipolarity of the USSR is most pointedly addressed by the respondent Vēsma Vilka:

> *I can only say, the sewing ateliers (for the people) and houses of models were two parallel universes. Models were to emphasize the greatness of the Soviet Union (although then it was referred to differently), not made for ready-to-wear. Even though neither public nor private transportation was suitable for getting anywhere in those garments (Vilka 2015).*

Fashion industry and mass production in planning economy could essentially be a utopian idea, utterly impossible. Fashion cannot exist in a totalitarian regime as it expresses the individuality, zeitgeist and freedom. For comparison – the Italian fashion industry during Fascist regime was structured bilaterally, where both directions were diametrically opposed. From one side – the Fascist order, instructions, behaviour and style, from the other – freedom for individuality and own sense of style. Both of the opposite mechanisms coexisted throughout the regime (Paulicelli 2004, 4). To compare the Italian experience with the Soviet Union's – the Soviet regime existed for a much longer period of time, it was more repressive with millions of victims, but was not as thorough or methodical as Fascism.

4 'Zero' Society

Today sustainability and recycling practices are honoured in the society, 'green thinking' approach encouraged and taught in schools; for instance, the elegant and modern garment repair 'Clevercare' videos by Stella McCartney sustainable luxury brand are rather popular on YouTube. Sweden is ranked the most sustainable country in world (RobecoSAM AG 2015), which paradoxically invites parallels with the pattern of the Soviet Union: having a mass production industry and sustainability seedlings at the same time. However, recycling in Soviet Union was a necessity and a habit to be concealed, rather than touted, and its motives were not ecological or environmental thinking (Tihomirova 2015).

It was possible to remake the garments in specific 'ateliers for garments repairing and re-sewing' (Gurova 2006, 97). The citizen could make a new garment from two or more used ones, or from a combination of what was available (Redina 2015), "make a two-piece costume from an old coat, or a garment made from re-sewing the inside out" (Gotsouliak 2015). Other interesting services included cutting out the old and threadbare parts and replacing them with other fabric, or fabric gathered from edges and the inside parts of the clothing. (Indeed, such practice was described as early as 1840s by Nikolai Gogol in his short story 'The Overcoat'.)

Before the technological process, additional work had to be done – laying out, cleaning, hydrothermal processing. It was very common to partially renew the garment by canting some details, but leaving pockets, the frontal details and plackets intact. Decorative or complementary fabrics were used to make the garment a few sizes bigger or smaller, more up-to-date, or to replace the wilted and outworn collars, cuffs, fastenings and pockets. Māra Kapče in her tutorial for the light industry technical schools teaches how to invisibly mend clothes:

> *The patch is cut out from the same fabric as broken garment as a square. The thread has to be pulled out from all the edges approximately 0,5 – 0,7 cm width. The frills of the patch then must be drawn into the left side of the master fabric with a specific needle and secured with a fusible (Kapče 1980, 232)*

Soviet government supported the do-it-yourself subculture (Huber 2015) by organizing special sewing and construction training courses for adults, issuing self-tutoring guides on the subject, and inventing housekeeping lessons for girls in schools (while at the same time boys were attending 'labour training' lessons). Meanwhile, the houses of models were analysing Soviet peoples' obsession with cinema, actors and everything 'foreign' and intervened with magazine articles on propagandistic and sometimes advisory topics.

The sewing practices were passed on from generation to generation just like the pre-war Singer sewing machines which became very dear to their users (Tihomirova 2015). The houses of models were integrating their creative potential even in the DIY segment by reproducing elementary models and patterns which were easy to create without specific technologies (Huber 2015). The models and patterns in Soviet magazines were not always corresponding correctly: sometimes the drawing model and pattern in the section 'Let's make it ourselves!' was simply filling the empty space (Balode 1961). The hand-making and DIY field of interest was under supervision of the houses of models. It was the beginning of the distinctive do-it-yourself subculture in Soviet citizens' everyday life. The culture scholar Olga Vainstein describes the private sewing masters as "an unique women's self-modelling gender sphere, which helped a lot of women not only to develop their own dressing style, but also to create the unique symbolic space, their own subculture" (Huber 2015).

Of the abundance of sustainable practices, the most charming one was borrowing garments from friends for dates or special events. The friendships started in schools, institutes or workplaces lasted a lifetime, friends were together 'in sickness and in health'. One could borrow anything from a friend – even, if necessary, quite large sums of money (Gotsouliak 2015).

Other remarkable up-cycling and re-cycling activities were done at home or with help from private sewing masters. Interview respondents remembered a lot of sustainable and zero-waste activities. People were re-sewing easiest parts of clothing, sewing-in or letting out seams and length, decorated or altered old garments with new appliques, collars, crochets, buttons, laces or frills. Wedges were sewn into armholes of dresses or as decor in trousers, dresses and skirts.

It was an ideal example of a zero waste society – everything could be useful in Soviet Union. Soviet citizens were not quick to throw out garbage. The monthly magazine 'Наука и Жизнь' (Nauka i Zhizn, Science and Life) provided advice from professionals, and readers themselves could send in their ideas and inventions under the sections 'Tips for Master at Home' or 'Small Artifices'. For outsiders of USSR it looked like advice for those in complete poverty. In reality the magazine was

popular among people with higher and technical education. The main idea was not to throw out anything, as it can be useful to repair other worn-out clothes or broken items. There were a lot of tips on how to repair zippers. The plastic zippers were found only on imported goods, so no-one could replace the broken plastic zipper as they were not produced in the Soviet Union. Readers and engineers advised other readers on how to intricately sew back the broken parts or how to glue a zipper, or even to attach a small loop to prevent the constant opening of a worn-out zipper.

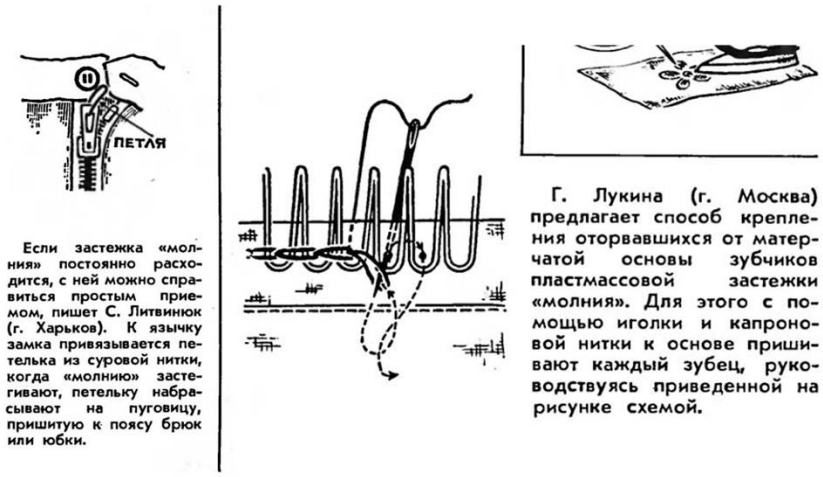

Figure 3. How to repair broken zipper. Tips for Master at Home. 'Наука и Жизнь' (Nauka i Zhizn, Science and Life). 1979

The use of adhesives was very popular in households. People used glue to to repair zippers, fittings and press-buttons, as well as to repair worn-out bottom edges of trousers and jeans.

As it was hard and sometimes impossible to buy the necessary fabrics, women used old clothes, husbands' clothes, curtains, napkins, towels, blankets, carpets, or table-cloths for re-sewing and up-cycling purposes. "My mother made a tote for everyday purchases by sewing together a lot of garters", said one respondent (Veilande 2017). It was popular to gather yarns from unpicking old sweaters, socks, pillows, knitted or crocheted blankets etc. Sometimes one could purchase raw wool or non-dyed yarns. The yarns were soaked and washed in bathtubs, hand-dyed, and rolled in clews (Buravcova 2015). In the article 'Updates from Old Jersey and Knitwear' by Rogozina and Khrushcheva one can be blown away by creativity level of the authors. The paragraph described the making process of the yarn 'White Birch'.

> *Unpicked machine-knitted garment's yarn is very thin and for hand-knitting purposes it is important to roll in three or four threads. For the yarn 'White Birch' 29 – 30 lengths of white, light-grey or pale-yellow and one length black thread is required. The black thread must be 3-4 times thicker than light ones (Rogozina and Khrushcheva 1979, 297).*

Comparing the Soviet Union's do-it-yourself and other sustainability practices to the terms contemporary meaning and purpose, Soviet practices have more to do with the war-time culture of scarcity, as people were ashamed of their repaired and re-sewn garments. Nowadays re-cycling and upcycling are widely accepted and praised practices in the West, motivated by care for the biosphere and the virtue of frugality rather than need.

5 Conclusion

The fashion as well as all other aspects of Soviet citizens' daily life was balancing between two parallel systems of ethics: the double-hearted strategies for surviving in the Soviet regime, and the

value of deep and meaningful relationships between friends, family and colleagues. This finding is strongly evident in oral narratives obtained through interviews for this paper.

The ultimate struggle of Soviet fashion industry was brought on by planning economy, censorship and limitations of bureaucracy, lacking of collaboration and organisational hierarchy in decision making, and chaos in supply chain and distribution. It does not matter how big, powerful and well educated the industry was – with no freedom, it is impossible to explore the depths of creation.

However, real inventiveness can be found in Soviet citizens' pursuit of clothing and accessories. The greater part of apparel was home-made: sewn or knitted by hand, including restoring, mending and re-sewing (the most intriguing part of all). The rest came from private sewing masters, ateliers, shops, commission (second-hand) shops and illegal purchasing of foreign clothing and accessories. DIY subculture in Soviet Union was a quiet organisation, not manifesting its resourcefulness and creativity as mending and re-sewing practises were to be ashamed of (as confirmed in the interviews). It would make an excellent example of a zero-waste society today: everything is useful, everything can be repaired.

Was there sustainability in fashion in the Soviet Union? If anything, Soviet economic system with its seemingly infinite resources, 'cheap' oil and gas, plentiful labour and gigantic landmass, was one of the most wasteful ones known to man. Even while they designed and launched space rockets, the Soviets were unable to supply their citizens with decent shoes – not dissimilar to what we are seeing in our own time in North Korea.

The sustainable fashion in Soviet Union emerged not from the love of the planet, but from its exact opposite – this legendary sloppiness and wastefulness, which left the 'consumer sector' short of textiles and wearable clothing, as well as most other goods.

The research demonstrates that it is useful to cross-check oral narratives with written and visual sources, as they can be biased by propaganda and the transitory nature of memory.

The next logical steps forward in the research on the topic would be a more thorough and targeted research of the DIY sustainable practices in Soviet Union. This rich and yet unexplored layer of resources can serve as inspiration to contemporary designers and artists in shaping the future of sustainable fashion.

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Section 7.

Designing Social Innovation in Cultural Diversity and Sensitivity

DRS 2018 Design Research Society 2018 Catalyst

University of Limerick
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Editorial: Designing Social Innovation in Cultural Diversity and with Sensitivity

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Most places where we live and work are becoming, if not already, culturally plural due to movement of people, ideas and practices over decades or even centuries. This is signaling a need for greater openness and curiosity on one hand, and a questioning of judgment and hegemony on the other to curb the surge of intolerance of 'others' in the context of increasing global social, political and environmental challenges. Design and social innovation has been an active and willing field in addressing such challenges, yet we have also identified how little is known or shared on complex and entangled conditions that shape how different people are coming together to catalyze changes to occur. This has been noted and reflected in discourses in postcolonial HCI that 'speak at once to the highly local and contingent practices that we see at work in different specific sites of technology design and use, while at the same time recognizing the ways that those localisms are conditioned and embedded within global and historical flows of material, people, capital, knowledge and technology' (Irani et. al 2010: 1317).

When design/designers enter into existing circumstances to enable social change, they can disrupt existing practices, reconfigure local power-dynamics and shift gender relations in intentional or unknowing ways. In other words, design/designers are implicated in becoming a constituent of transforming cultural practices. Yet nuanced and detailed understanding of cultural heterogeneity in social innovation have not been emphasised in design research as much as generalizable tools, methods and technique as knowledge (Akama & Yee 2016). Several reasons are speculated, such as the lack of theoretical and methodological knowledge that addresses the challenges of understanding their complex forms. Another factor could be a deferral to other fields (such as sociology or anthropology) to study cultural dimensions and thus excluded from the scope of design research. In foregrounding cultural nuances when designing with others, what issues, questions and concerns are significant to keep in view? What can help those who intervene, including stakeholders with certain agendas and existing practices as well as the 'local community', become aware of and work with existing and morphing cultural logics? This Special Track is convened to build dialogue and understandings of design and social innovation in cultural diversity. We seek to trouble literal and static distinctions of cultures that are assigned to countries, nations or groups of people to explore how we can develop greater sensitivity and nuance when working with people and intervening in designing our futures together.

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This Special Track is facilitated by colleagues who are co-founders and participants of a research network called Design and Social Innovation in Asia-Pacific (DESIAP). This network has hosted multiple gatherings in Southeast Asia since 2015 to celebrate the heterogeneity of Asia-Pacific region that consists of a constellation of islands, countries and continents where many Indigenous and traditional cultures have been resilient in spite of colonization. Our events have so far gathered researchers and practitioners who are initiating change in Australia, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, the Philippines, Singapore, South Korea, Sri Lanka, Taiwan and Thailand to examine how change-making practices are enabled and conditioned. The embodiment of cultural plurality is a shared condition that characterizes the conveners as well as all DESIAP participants who have taken part. In this way, they are 'multi-local' and have diversity in heritage, language, upbringing, education and in places where they have chosen to live, study and work. Following prominent scholars in postcolonial theory, feminist studies and cultural theory, we have begun to explore 'what aspects of our humanness a cultural tradition tends to emphasize, enhance, and preserve as central'? (Kasulis 2002, 20). This is a view of seeing cultural difference that is not defined by fundamental distinctions but to see what is 'foreground in one culture may be background in another'? (Kasulis 2002, 20) to side-step any dualisms of West/East or North/South. There is a tendency and entrenched legacy of research towards replicable, generalizable knowledge, especially coming from the social sciences to 'evacuate the local by assimilating it to some abstract universal' (Chakrabarty 2000, 18), but many notable scholars have already reminded us that this framing of 'knowledge' is just one of many worldviews. In other words, we must be vigilant of replicating dominant logics that are embedded in certain fields and discourses like design to respect and accommodate that for other worldviews, words, ideas and knowledges cannot be detached from places, people and practices in which they are located so they cannot be moved to another 'context' (Law & Lin 2017). Following such scholars, we seek to acknowledge and understand the multiple and invisible dimensions that are inherently entangled within a term like 'culture' and enhance our abilities in nuancing the heterogeneity that constitutes design and social innovation.

The papers to be presented in this track are situated in diverse contexts including China, Greece, Kenya, Thailand, Sweden, and the UK. In the first paper, Cyril and Joyce note that our knowledge of design for social innovation outside Europe and the US is still insufficient. As part of an endeavor to investigate what constitutes design and social innovation initiatives in the Asia-Pacific region, they report the workings of social hierarchy in design and social innovation in Bangkok. Reflecting on the experiences of practitioners and stakeholders, they highlight the effects of social hierarchy in design and social innovation initiatives. The second paper presented by Nilsson and Hansen Ottsen introduces a method called the Co-archiving Toolbox developed with an aim to increase the diversity in public archives. In co-design workshops, they used the method to explore and prototype different ways to document and archive refugee stories. Although the effectiveness of the toolbox is yet to be validated, this paper demonstrates the potential of an inclusive approach to designing public archives and creating opportunities to discuss and re-think the archival mission in multi-cultural societies. The third paper by Pschetz et al. discusses "the situated energy values" in rural Kenya. Through an interview and probe-based study, they investigate how culture influences the interaction between peoples' values and energy systems. In particular, they explore "how values influence the perception of energy needs, how boundaries between business and home contexts are less defined than often assumed, and how widespread narratives of profit creation based on appliances may conflict with communal interests and aspirations of energy users." The fourth paper presented by Vlachaki et al. is about prosthetic preferences in the UK and Greece. It aims to understand people's preferences towards prostheses and cultural influences on their preferences so as to design more suitable prostheses for them. The similarities and differences between the two countries are presented and interpreted based on existing culture models. The last presenters Guo and Ji use food as a medium to address immigrants' loss of ethnic heritage and identity in the process of acculturation. With a case of designing a food delivery service for young second-generation Chinse

Americans, they explore food as a design object that addresses conflicts and contradictions related to culture and identity.

The cultural portfolios presented by the aforementioned papers are diverse indeed. Not only is there a diversity in the cultural identity of people involved, but also in the culture elements addressed by the authors, i.e. behaviors and attitudes in the use of a product or a service, technologies and surrounding environments, and values and assumptions underlying peoples' needs. We thus look forward to sharing with the audience a wide spectrum of issues to contemplate and discuss design, social innovation, and culture.

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Social Hierarchy in Design and Social Innovation: perspectives from Thailand

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Our knowledge of how design and social innovation works outside of the Europe and the US is still insufficient, due to the limitations that are inherent to the prevailing perceptions, methods and tools, developed in and for this context. Although the importance of social relationships has been acknowledged, how social hierarchy, which is firmly rooted in many non-western societies, interacts with the design and social innovation process is scarcely documented. In this paper, we wish to expand on existing knowledge by sharing the experiences of practitioners and stakeholders involved in design and social innovation initiatives in Bangkok, highlighting the various ways that social hierarchy influences their practice.

design and social innovation, Thailand, social hierarchy

1 Introduction

Underneath Bangkok's skyscrapers an undercurrent exists of like-minded professionals from various backgrounds who actively use design in various initiatives geared towards social change. Often involving the participation of stakeholders, such as (local) governments, commercial parties and local residents, it is a practice known as design and social innovation (Hillgren, Seravelli & Emilson, 2011; Manzini, 2015). The sheer amount and variety of initiatives active in Bangkok and the rest of Thailand stand in stark contrast with how little is known regarding the context and conditions in which they operate. The European approach to design and social innovation, which currently dominates the field of study, is characterised by the exporting of methods and ideas developed in Europe and adapting them to local contexts (Jégou & Manzini, 2008). However, whether these best practices are suitable for, or even desirable in, other contexts is questionable (Brown & Wyatt, 2010), with the additional threat of replacing knowledge and solutions developed locally (Bala-Miller et al., 2008; Akama & Yee, 2016). As local, culturally specific factors are rarely included in design and social innovation studies, information about their effects is limited.

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Field studies conducted in Bangkok during 2016-2017 found a multitude of individuals, collectives, project teams and organisations addressing a wide range of local issues, using various types of design, operating on different scales and collaborating with a variety of stakeholders. Data collection using Activity Theory, a framework that enables the study of initiatives together with their respective ecosystems, provided new insights into how local initiatives function by examining their inner workings as well as the (power) relations between stakeholders. Preliminary findings indicated the influence of the Thai context on the design and social innovation process through the importance placed on issues surrounding education, religion and the local government, among others (Tjahja, Yee & Aftab, 2017). Social hierarchy, in particular, appeared to be a recurring theme and was reported by several interviewees to have influenced their practice or involvement in different ways and on multiple levels. The aim of this paper is to examine the nature of social hierarchy in Thailand in relation to design and social innovation, highlight when, where and how it interacts with the process and lay a theoretical foundation in order to increase our understanding of the phenomenon.

2 Background

The current study is part of a larger on-going PhD research project which aims to determine what constitutes design and social innovation initiatives in the Asia-Pacific region through the construction of case studies based on data collected from initiatives in Hong Kong, Bangkok and Kuala Lumpur. The research focuses on *why* design and social innovation projects are initiated, *for whom* they create value and what role *design* plays in creating this value.

3 Design and social innovation in a Thai context

The field studies conducted in Bangkok indicate that the use of design methods in social innovation is rapidly becoming commonplace in Thailand, evidenced by the increasing amount of initiatives that could be characterised as design and social innovation, although practitioners might not always subscribe to or identify themselves with this term. Local issues and concerns, such as education, urban renewal, heritage and social activism are addressed or promoted by using design approaches, such as community architecture, gamification, co-creation and graphic design. Most initiatives appear to be bottom-up, although many receive indirect support from the government. The Thai Health Promotion Board is a frequent funder of projects as design and social innovation initiatives are often perceived as beneficial for the general health and well-being of citizens. Unfortunately, academic research on design and social innovation in Thailand is rare. A notable exception is a study conducted by Natakun & Teerapong (2014), in which they found that contributing time or skills to solve social issues has become particularly popular among young Thais and commercial organisations, the latter often providing support through Corporate Social Responsibility (CSR) programs. In addition, professional reputation and existing networks were deemed to be important sources for acquisition and support for Thai organisations involved in design and social innovation.

The notion that design and social innovation is built on relationships (Murray, Caulier-Grice & Mulgan, 2010; Baek & Cho, 2012; Manzini, 2015; Akama & Yee, 2016) is particularly meaningful in this context as Thais attach great value in maintaining 'smooth' social interactions. This is accomplished by avoiding hurting others' ego, not to overtly criticise them nor reject their good intentions, and maintaining a disposition that is flexible, polite, calm and humble (Komin, 1990). As Thai society is ordered in a hierarchical fashion, where criteria such as age, education level family background and professional rank manifest itself in all social relationships, awareness of relative place in the social hierarchy and deference to those higher in rank is expected (Boyle, 1998; Wetprasit, 2016). Subsequently, the smoothing of relations also entails being aware of and acting according to social hierarchy (Mulder, 1996).

4 Social hierarchy

Social hierarchy, also known as status hierarchy or social stratification, is commonly understood as an implicit or explicit order of individual or groups according to a social dimension and is pervasive to the extent that it is considered a fundamental type of human relation (Fiske, 1992; Magee & Galinsky, 2008). It has been studied in sociology, social psychology, organisation studies and developmental studies, among others, in relation to topics such as collective action (Simpson, Willer & Ridgeway, 2012), cognition (Zitek & Tiedens, 2012), self-perception (Anderson et al., 2006), social identity (Doosje et al., 2002; Cunningham & Platow, 2007), social dominance (Sidanius et al., 2003), occupational stress (Bacharach, Bamberger & Mundell, 1993), gender (Hays, 2013), prejudice (Rudman et al., 2012; Wilkins & Kaiser, 2014) and inequality (Charoensy, 2012; Kerbo, 2012). Although the underlying premise that there is some kind of differentiation made among individuals or groups is generally agreed upon by scholars, theories on what basis this difference is made vary. Gould (2002) distinguishes two schools of thought in social sciences: differentiation based on the quality of individuals' personal characteristics or differentiation based on the quality of the social positions they occupy, regardless how these positions were obtained. Thye (2000) and Magee & Galinsky (2008) consider power, based on control over resources, and status, conferred by others, to be the primary dimensions of social hierarchy. Sidanius & Pratto (2001) view human social systems as group-based social hierarchies where the dominant social groups possess a disproportionate amount of positive social value compared to groups who possess mostly negative social value.

4.1 Social hierarchy in Thailand

The origin of social hierarchy in Thailand can be traced back to the 15th century, where the feudal *sakdina* system stratified individuals into ranks according the size of their allocated land or rice field (*sakdi* = power and *na* = rice field) This hierarchical system of patronage helped maintain the flexible and interdependent Thai societal structure and determined an individual's rights, wealth, political power and public responsibilities (Boyle, 1998; Kitiyadisai, 2005). Life in modern Bangkok is still characterised by the constant appraisal of whether someone is considered higher or lower than oneself in the social hierarchy. Status differentiation has evolved to become increasingly complex and is not necessarily based on existing objective social structures but can include variable subjective interpretations depending on contextual and situational variables, such as wealth, seniority and urbanity (Vorng, 2011). It is important to note that Thais generally do not have negative associations with social hierarchy (Mulder, 1996), which differs from the view that particularly prevalent in western society, where it is perceived as an intimidating force instead of recognised as a type of relationship (Fiske, 1992). Another notable difference is the fluidity of Thai interpersonal social relations, characterised by the constant shift in social status depending on the situation, which do not fit the western, rigidly structured notions of social hierarchy (Vorng, 2011).

4.2 Social hierarchy in design and social innovation

There are currently few studies that explore the effects of social hierarchy on the process of design or design and social innovation. Akama & Yee (2016) highlight the approaches two initiatives in Singapore have taken in relation to social hierarchy. The founder of *The Thought Collective,* a group of social enterprises, interprets hierarchy as respecting and recognising experience from seniors rather than focusing the role itself. In a similar fashion, the *Ground Up Initiative* promotes an environment where one can learn from elders. A small number of studies have examined social hierarchy in relation to participatory design. Puri et al. (2004) observed in their study, in which they adapted District Health Information Software for use in the Indian state of Andhra Pradesh using a participatory design approach, that participatory processes originating bottom-up, common in Scandinavia and the UK, were unlikely to succeed in India. This was perceived to be due to the traditionally strong hierarchical society. Participatory activities therefore will have to be initiated top-down by high-ranking government agencies, such as in this case, the Chief Minister's office. Yasuoka & Sakurai (2012) sought to determine to what extent participatory design would be successful in Japan, which also possesses a deeply-rooted hierarchical culture. In a series of

workshops, a variety of stakeholders from different backgrounds were asked to brainstorm social and economic solutions to the destruction caused by a massive earthquake and tsunami which took place the same year. Although social hierarchy has always been a major issue in Japan with any kind of participatory activity, their findings suggest that the occurrence of a disaster enabled a change in social dynamics, creating a more favourable environment for a participatory approach. As such an extreme situation was unprecedented, senior participants could no longer rely on their superiority based on previous experience, which stimulated the creation of a 'flat' community. In another study by Yasuoka (2012), in which participants in Denmark and Japan played a participatory design game in a workshop setting, the rules were modified to minimise the effects of social hierarchy as this time the workshop took place in a 'normal' situation.

The examples from India and Japan illustrate that social hierarchy exert considerable influence on the design process. Design and social innovation initiatives, in particular, are prone to be affected, due to their frequent use of participatory processes, such as co-creation, and their reliance on the involvement of stakeholders, whose social status can vary. Despite the fact that social hierarchy has been studied extensively in other academic disciplines, existing theories are not entirely relevant, do not sufficiently take the local cultural context into consideration or only partially address the issues that occur in the context of design and social innovation, necessitating the development of alternative perspectives. Failure to acknowledge and understand the role of social hierarchy in the design and social innovation process could result in the implementation of solutions that do not sufficiently address the needs of the stakeholders, or worse, render the entire initiative useless.

5 Methodology

The findings that are presented in this paper are based on data collected during two separate field studies in Bangkok, conducted in 2016 and 2017. Within a period of three months (both studies combined), 19 stakeholders of 7 different design and social innovation initiatives were interviewed about their involvement. The interview questions were loosely guided around the Activity Theory framework, the primary data collection method in the main PhD research project. Subsequently, an approach based on Grounded Theory was adopted to generate theory from the data obtained.

5.1 Activity Theory

Design and social innovation practice is deeply rooted in its specific context and locality. Activity Theory (AT) departs from the assumption individuals should be studied along with their surrounding social structures by focusing on the activity that is generated by them (Engeström, 1999). Using the AT framework to analyse design and social innovation initiatives can therefore provide insight into their unique ecosystems, along with the specific factors which exert influence on them. For a more in-depth discussion regarding the suitability of AT in the study of design and social innovation, see Tjahja, Yee and Aftab (2017).

The AT framework, or *Activity System*, is usually visualised as a triangle with six interrelated concepts (see figure 1). The upper part of the triangle, consisting of *subject*, *tools* and *object*, represents an activity by a subject, using certain tools to achieve a particular outcome (Tan & Melles, 2010). The bottom part consists of implicit or explicit *rules*, the local or broader *community* and the *division of labour*, linking the activity, symbolised by the upper triangle, to the wider social context (Chatzakis, 2014).

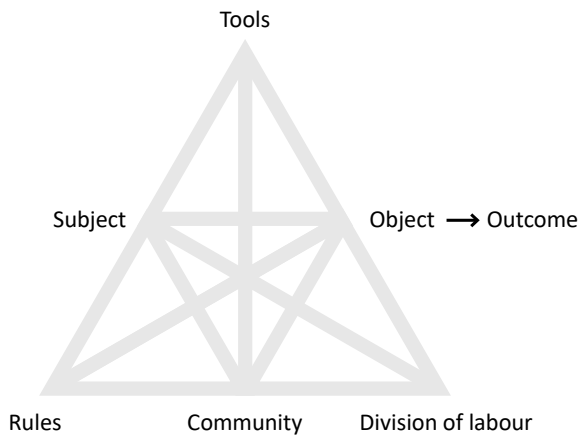

Figure 1 The activity system – adapted from Engeström (1999)

The issue of social hierarchy was brought up by thirteen interviewees from six different design and social innovation initiatives, on most occasions when asked about limitations, challenges and restrictions that influenced their work, in other words, the *rules* governing their initiatives. In the first field study, this occurred without any form of prior prompting from the researcher. In the second field study, however, social hierarchy had already been noted as being one of the recurring themes in design and social innovation in Thailand. Interviewees were therefore occasionally prompted by the interviewer to elaborate on the topic, although in some instances the topic of social hierarchy was still brought up without being solicited by the interviewer.

5.2 Grounded Theory

Grounded Theory is a methodology that enables the development of conceptual theory from systematically collected data (Glaser & Strauss, 1967; Glaser, 1999). The theory, along with its hypotheses, is generated simultaneously with the gathering, coding and analysis of the data, thereby ensuring the theory's relevance to the phenomenon studied (Howard-Payne, 2016). During this process, concepts emerge which are grouped to form broader, more abstract categories. The establishment of relations between categories, eventually leads to the forming of the theory (Corbin & Strauss, 1990).

6 Findings

6.1 Co-create Charoenkrung

The Thailand Creative and Design Center (TCDC), a public organisation under the Office of the Prime Minister, focuses on the promotion of design and creative practice in Thailand. *Co-Create Charoenkrung* is a large-scale top-down urban renewal project that was initiated in 2016, accompanying their relocation from the centre of Bangkok to the historical Grand Postal Building in the Charoenkrung neighbourhood. The relocation marked the beginning of TCDC's ambition to initiate a creative district in Thailand that has been co-created and co-designed with its residents and other local stakeholders. Several of the co-created proposals were prototyped on true (1:1) scale, a first in Thailand. TCDC's policy manager, who initiated and oversaw the overall project, and the project manager in charge of design, noted several aspects related to social hierarchy.
Both respondents mentioned the significance of high level gatekeepers and influencers within the local government. As (lower-ranking) civil servants are generally reluctant to be involved in issues they perceive to be outside of their authority or interests, failure to convince these key figures could cause a bottleneck, effectively ending the project. Therefore, taking advantage of existing networks in order bypass the traditional hierarchy or bureaucracy was found to be beneficial, and often necessary. In addition, negotiations with high level officials from local authorities were carried out by the policy manager's superior to increase the likelihood of cooperation. As such, TCDC believes that a top-down approach is a must for a design and social innovation project to be successful in this

context and on this scale. Moreover, the status and seniority of some participants in the co-creation workshops was reported to have inhibited those who perceived themselves lower in hierarchy. Consequently, custom tools had to be designed to ensure the participation of all participants.

6.2 Deschooling Games

A collective that aims to solve problems by equipping their clients with the (design) skills to gamify learning experiences, Deschooling Games consists of multi-disciplinary team with three core members: a training facilitator, a teacher/activist and a designer, occasionally enlisting volunteers to facilitate during their sessions. The collective views social hierarchy in relation to education and sees it as their challenge to empower the bottom (students, parents and teachers), while at the same time giving ideas to the middle (management and HR) with the ultimate aim of creating movement in the Thai educational system, which they perceive to be stagnant. Two other stakeholders have offered their views on social hierarchy: One of Deschooling Games' volunteers, an engineer who often helps out as a facilitator or game designer, and one of their clients, a faculty Dean at a university in Bangkok.

The dependency of social hierarchy on role and context was mentioned by both respondents. The engineer reported to be more inclined to challenge social hierarchy in his workplace, as in this role his professional expertise is grounded in empirical facts. In the context of a Deschooling Games co-creation workshop, however, as a game designer and one of the interested volunteers, he does not have an expert role, making it more difficult to challenge social hierarchy. According to the Dean, who actively encourages co-creation and implements its practice in his own faculty, how social hierarchy is perceived depends on the design of the organisation and the division of labour; It is a matter of being able to separate different roles and communicating to each other effectively. For example, when it comes to negotiations with or presentations to clients, the Dean will take the lead. When discussing projects, however, he will join his staff and discusses with them as an equal. One role does not necessarily have to interfere with the other in participatory practice – everyone takes on different roles in different contexts. Moreover, the Dean perceives the argument surrounding social hierarchy to be an ideological one, in the sense that the common consensus appears to be that society should strive towards a flat hierarchy. He argues that this is not an accurate representation of what happens in real life. Instead of criticising the existence of social hierarchy, the focus should be on sensitivity towards it by being able to detect when relationships are not smooth.

6.3 CROSSs

A social architecture agency which started out as a volunteering organisation, CROSSs developed into a team of four architects and one designer, formalising their initiative into a professional agency in 2016. CROSSs often works in rural areas of Thailand on a wide range of projects, from the redesign of interior spaces to city-wide urban renewal. Aside from being architects, they often take on different roles within their projects, such as connectors and facilitators. Two team members elaborated on the methods the agency uses to actively eliminate negative effects of social hierarchy. For CROSSs, the major issue with hierarchy is that it can prevent some people from being involved in the co-creation process. For example, if citizens feel reluctant to voice their honest opinions in front of their mayor, it becomes a problem; Sometimes a 'recalibration' of hierarchy is necessary to stimulate the sharing of ideas in an open manner. CROSSs realised that the conscious shaping of the space, often by arranging the seating positions before a meeting takes place, changed the way people communicate as well as the hierarchy within that space. So instead of facing the front, listening to one speaker, CROSSs encourages the levelling of social hierarchy by having the participants in their meetings and workshops sit in a circle. In this way, the mayor of a town will sit at the same level as its citizens, with everyone seeing eye to eye. Another tool that is often used by CROSSs is to let participants write their ideas on paper instead of saying them out loud to avoid overtly challenging figures of authority. The team members emphasise that the existing social hierarchy can also be used as leverage in certain contexts. If high-ranking individuals, such as

community leaders, grant their support to an initiative, they can convince people to go along with him, facilitating the flow of the process. Moreover, communicating directly with those on top of the hierarchy prevents the dilution of the ideas that the agency wishes to get across, as the initial message will no longer be 100% accurate if it needs to travel up through too many levels.

6.4 Pom Mahakan

Built against the wall of a historical fort, the village of Pom Mahakan consists of a small community living in wooden houses, located in a prime location near the Grand Royal Palace in the middle of urban Bangkok. The Bangkok Metropolitan Administration (BMA) has been trying to demolish the village since the 1960s and its residents have been resisting ever since. The community has contacted various outsiders, such as academics, designers, architects and others who are sympathetic to their cause, as well as the government itself, to co-create a solution for the current situation. The direction they are currently pursuing is that of a 'living heritage museum' which may convince the government to keep what is left of the village intact. Three stakeholders who were interviewed regarding their involvement with Pom Mahakan commented on issues surrounding social hierarchy: A local social entrepreneur who is actively involved in the co-creation activities surrounding the village and two architects who are members of the Association of Siamese Architects (ASA).

Two interviewees mentioned that the community leader is a forceful character, with strong opinions which are not always shared by the other villagers. The aim of the co-creation activities in this context was to enable the voices of the community to be heard and be considered. Subsequently, the leader was asked not to be present during the co-creation activities to ensure villagers could share their thoughts freely. In this example, the negative effects of social hierarchy had to be neutralised to ensure that the view of an individual does not override the view of the community. Furthermore, the strained relationship between the villagers and their leader could potentially weaken their position when negotiating with the BMA. Both architects emphasised that support from the authorities is crucial in order to succeed. Initiatives have to be viewed by the government as benefitting their own policies or they have to be backed by those high in the hierarchy, such as members of the Thai royal family. Although they are not able to help directly, they can be referred to as being sympathetic to the cause.

6.5 Bangkok Chinatown

The neighbourhood of Talat Noi is part of Bangkok's Chinatown and borders the Charoenkrung district. The *Bangkok Chinatown* (*Yaanjean Thin Bangkok*) initiative predates *Co-create Charoenkrung* and was initiated in 2012 by a group of architects and sociologist, with one of the initiators born and raised in the area. Similar to its neighbour, local residents were brought together in the rejuvenation process, which utilises various design methods, such as co-creation and the prototyping of ideas. As the agency needs to arrange the funding for each individual project separately, they accomplish their aim of urban renewal by doing one project at the time.

As some of the other initiatives, Bangkok Chinatown experiences effects related to social hierarchy during the co-creation process. The agency's founder attempts to reduce these negative influences by creating many levels of meeting. For example, some groups consist mainly of people who occupy higher social status, such as policy-makers, representatives from the government, landlords and big business owners, who can often offer a broader vision of what would benefit the community as a whole. Other groups consist of community leaders, local citizens and small business owners, who can give more detailed insights into how and what should be done to improve the current situation. Usually, individuals with a high social status will not participate in the co-creation sessions as they do not have the time. Instead, they will often join the first meeting to give ideas and the last meeting to witness the results. In other instances, they will send their subordinates to attend the meeting, who will only observe and report back to their superiors. However, when high status people do attend the workshops, their opinions tend to dominate the opinions of (lower-ranking) neighbourhood committee members, who feel inhibited to express their thoughts in front of those they respect.

Therefore, when organising large workshops, participant groups are separated along 'horizontal lines', with members of the same hierarchy in the same group, allowing the participants to open up and feel more at ease. All groups use the same co-creation tools and after discussion the results will be shared between the groups. The founder perceives social hierarchy to be natural and not considered a major issue. Instead, he tries to focus on combining the ideas that are generated in the meetings in order to benefit all stakeholders involved.

6.6 The Rambutan

Consisting of two partners who are graphic designers, *The Rambutan* aims to promote graphic design as a means to raise awareness for social issues. They organise workshops and events for graphic design students to show them the possibilities of graphic design as a means for social activism.

The partners state that although social hierarchy is particularly present in Thailand, they try to emphasise equality instead. They believe that knowledge is needed to accomplish this, as people of any hierarchy will listen if the message that is being conveyed makes sense to them. The duo does not attach any value to social hierarchy in their practice, but does acknowledges its existence, noting that the creative industry in Thailand is dominated by designers who are well-established. Even though The Rambutan operates in a completely different area, they are indirectly affected by these authoritative figures as their voice is louder and carries more weight. Even if information is wrong or outdated, the opinion of a professional graphic designer is valued far less than a design professor, who is often seen as the 'expert' in the subject, even by his clients. This isn't helped by the fact that the general public does not possess sufficient knowledge to judge what is right or wrong and will therefore rely on traditional notions of expertise based on educational status. Hierarchy also manifests itself when the design students, inspired to pursue a social approach for their school assignments after participating in their workshop, are often overruled by lecturers who are uncomfortable with the idea of using design for social causes.

7 Discussion

Although perceived and/or experienced differently, all respondents acknowledged the fact that social hierarchy exists and that it is an integral part of Thai society. Moreover, the majority of the interviewees view social hierarchy as a permanent feature of Thai society that does not necessarily have to be challenged but has to be dealt with accordingly. Based on the respondents' observations regarding the effects of social hierarchy in relation to the design and social innovation process, the following categories were identified.

7.1 The negative effects of social hierarchy on the co-creation process

As the studies in India (Puri et al., 2004) and Japan (Yasuoka, 2012; Yasuoka & Sakurai, 2012) have shown, participation in co-creation activities is not a given in societies where social hierarchies are engrained in everyday life. This was also the case in Bangkok, where in four out of six initiatives the co-creation process had to be modified in one way or another to minimise the negative effects of social hierarchy and maximise the participation of stakeholders. In Co-create Charoenkrung, custom co-creation tools were designed to encourage participation of those lower in hierarchy. Co-creation sessions at Pom Mahakan were characterised by the absence of the village chief, to ensure the views of the other villagers would be heard. The team of Bangkok Chinatown grouped people of similar standing together during their sessions in the hope that participants would be more open in the company of those they perceive as equals. The architects of CROSSs actively shaped the space in which their co-creation sessions will take place by requesting participants to sit in a circle, thereby breaking down the hierarchy and encouraging the sharing of opinions, thoughts and ideas as equals. Awareness of the fact that social hierarchy and participation can interact with one another in co-creation processes is imperative to effectively negate its effects.

7.2 The necessity of leveraging on existing social hierarchy

Several respondents mentioned the dependence on the higher tiers of the social hierarchy. Support from above was reported by stakeholders from Pom Mahakan and Co-Create Charoenkrung to significantly increase the likelihood of success. In addition, having direct access to high-ranking people ('knowing the right persons in the right place') was considered to be an asset in the Co-create Charoenkrung project and by CROSSs, who added that it enabled them to communicate their message more directly to the decision-makers. CROSSs also noted that 'a good leader who makes good decisions' can be beneficial as they can considerably streamline the process. However, a leader can also create tension within a community which can harm the overall process, a concern voiced by some involved with the Pom Mahakan community. The founder of Bangkok Chinatown observed the dominance of those high in hierarchy in co-creation sessions over those who were considered to be lower, although the former contributed in a positive way by possessing the vision needed to push the initiative forward. Although they were not affected by social hierarchy directly, the team of The Rambutan expressed their difficulties in spreading their message due to resistance of the established designers and academics in the local industry, whose opinions are deemed to be of greater value because of their perceived higher status. Identifying key individuals and understanding the role that the higher echelons of the social hierarchy play, in particular in terms of support and facilitation, can greatly contribute to the success of design and social innovation initiatives.

7.3 The importance of understanding social hierarchy in the Thai government

A previous study has shown that the respective (local) government departments can have different attitudes towards design and social innovation, ranging from supportive to indifferent (Tjahja, Yee & Aftab, 2017). The insights gained from the respondents in this study support the notion that the organisational culture of public sector might be one of the underlying reasons of this ambivalent stance. As almost all initiatives in this study had some form of government support, an understanding of hierarchy within the government context is essential. The policy manager from TCDC, itself a government organisation, expressed considerable frustration in dealing with other governmental departments. Although some might be willing to cooperate, they are only able to do so within the limits of their jurisdiction, with a reluctance to be involved in issues perceived to be outside of their authority or interests. This experience was echoed by one of the architects working with Pom Mahakan, adding that Thai civil servants in general are not brave enough to stand up to their superiors out of fear of professional consequences. Although this is a common characteristic of those working in public service in other parts of the world, in Thailand it appears to be exacerbated by the effects of social hierarchy. Thai civil servants tend to avoid conflict and uncertainty, and are reluctant to voice their opinions towards colleagues or superiors. Pimpa (2012) attributes this behaviour to the concept of *ti tum ti soong* in which Thai people are perceived to be destined to occupy in a certain position in society. This position ('ti') is fixed and determined by their familial and social status. Therefore, superiors at top of the organisation or social hierarchy tend to be accepted due to their position, and not necessarily their professional merits. Those who follow the supervisor's orders and do not challenge their authority are traditionally perceived as being effective employees (Sriussadaporn-Charoenngam & Jablin, 1999). Furthermore, even when key figures are present that are sympathetic to the initiative, support in the long-term is never guaranteed due to the continued shifting of positions within the government. Additional supporters are needed to mitigate the problem of relying too much on a single key person. Therefore, an understanding of the influence and position of supportive key people in order to know who to lobby for support is necessary to ensure the long-term survival of a project.

7.4 The fluidity of social hierarchy

The notion that Thai social hierarchy is flexible or fluid, adapting to different situations and contexts (Vorng, 2011) was also attested in this study. Two respondents involved in the Deschooling Games initiative suggested that their respective places in the social hierarchy was not static but changes

depending on the situation that they find themselves in. The Dean perceived hierarchy as a product of organisational design and culture. Different contexts require the adoption of different roles, which can be separated from one another if communicated properly within the organisation. The engineer underlined the difference in his perceived status in his role as facilitator/game designer during sessions with Deschooling Games as opposed to his 'normal' professional role.

8 Preliminary ideas

There are several interesting ideas that can be further developed from the categories that have been identified in the previous section. First, hierarchy studies traditionally examine individuals as units of analysis *within* a group or the dynamics *between* groups. Design and social innovation initiatives, however, are characterised by interactions both within and between groups and individuals, sometimes occurring simultaneously. For example, within a project social hierarchy can exert a negative influence on participants during a co-creation process, but at the same time the project manager can make use of social hierarchy to elevate the project to a higher level by involving key people through his or her network. Second, the fluid characteristics of social hierarchy entail that someone can be affected directly or indirectly, depending on which role this person has at a certain point in time. For example, when a designer tries to minimise the effects of social hierarchy during a workshop, (s)he is influenced indirectly whereas the participants are the ones directly affected. Conversely, the same designer can feel the effects of social hierarchy directly when (s)he tries to negotiate with the local government and realises that their place in the hierarchy is too low to accomplish their goal. In turn, the government official, who might try to help by mediating within their own department, is indirectly affected. Third, aside from positive and negative, attitudes towards social hierarchy can also be characterised as being active or passive. An example of an active attitude would be the creation of custom tools by a designer in order to promote participation, whereas a passive attitude would be a neighbourhood resident who feels inhibited to speak their mind in the presence of someone regarded higher in status.

It appears that there are several dimensions of social hierarchy that are relevant in design and social innovation: types of interaction (within/between groups and individuals), degree of influence (direct/indirect) and attitude toward social hierarchy (active/passive). In addition, the dynamic and fluid nature of social hierarchy in Thailand, which might bear similarities to other cultural contexts, needs to be taken into consideration and explored further. The tentative ideas proposed in this paper will hopefully contribute towards a greater understanding of how design and social innovation is practised, particularly in non-western contexts.

9 Conclusion

The inherent reliance of design and social innovation initiatives on the support, facilitation and participation of stakeholders has prompted us to further explore the nature of the social relationships which lie at its foundations. The examination of the six Bangkok initiatives demonstrated that hierarchy in social relationships was present in various areas and stages throughout the process: Opening or closing doors, including or excluding people from participation, shifting and flowing from one social situation to the next. In societies were social hierarchy is an integral part of life, practitioners and stakeholders involved in design and social innovation have developed their own ways to deal with it, either using it to their advantage, or in some cases, attempting to reduce its negative effects. Using a grounded theory approach, a number of categories were identified from the findings, giving rise to ideas that can be used as building blocks for theories of social hierarchy in design and social innovation.

This paper exemplified the effects of social hierarchy on design and social innovation practice in Bangkok. Awareness of its existence and how it can influence the process can be beneficial for both local and non-local practitioners as well as organisations who are operating in contexts where social hierarchy is prevalent or whose work involves stakeholders who are affected by it. Questions regarding the role of the designer become current once again in this context. Do design and social

innovation practitioners need to actively position themselves inside or outside of the social hierarchy? Would this be possible and if so, what would the consequences be for the process? Furthermore, there are many other context-specific factors in Thailand, and elsewhere, that are in need of investigation, such as urban and rural environments, religion, racial prejudice, policies and legislation, to name but a few. Design and social innovation practice is as complex as the societies that they are meant to improve, with seemingly infinite intricacies and nuances. Contextual knowledge therefore is a prerequisite for understanding how and why certain concepts, ideas and initiatives (will) work and others not.

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The Co-archiving Toolbox – Designing conditions for diversity in public archives

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This paper reports the development of a method for increasing the diversity in public archives, referred to as the Co-archiving Toolbox and developed in collaboration with three museums. Museum professionals and refugees were invited to co-design workshops to explore and prototype alternative ways to document and archive refugee stories – told in their own voices and through their own perspectives. Besides elaborating on alternative, and more inclusive archiving practices, the project also explored how co-design approaches and prototyping can become a resource in re-thinking the role of archivists and museum professionals who are interested in co-archival facilitation. The co-archiving toolbox currently includes seven co-archiving practices designed to be applied at temporary refugee housing but could potentially also be used in other contexts. The project may serve as an example of how design interventions can contribute to developing existing archival practices by encouraging archivists and museum professionals to assume a collaborative approach.

co-archiving; co-design; refugees; museum professionals

1 Introduction

Living Archives is an interdisciplinary research project exploring archives and archiving practices in a digitized society from a range of perspectives. The purpose of the project "is to research, analyze and prototype how archives for public cultural heritage can become a significant social resource, creating social change, cultural awareness and collective collaboration pointing towards a shared future of a society" (livingarchives.mah.se, accessed on 2018-03-06).

One of the research themes of the project is *co-archiving*, which aims to explore and develop collaborative (co-)archiving practices involving underrepresented voices in generating archival material for the public archives. The underlying assumption is that this inclusive archiving approach opens up the archiving process by inviting more people to contribute to the public archives, which would create conditions for diversity and result in more representative records of human existence (Dunbar, 2006; Warren, 2016).

The starting point for the co-archiving research theme began with a quotation by Derrida (1995, p. 4): "There is no political power without control of the archive, if not memory. Effective democratization can always be measured by this essential criterion: the participation in and access to the archive, its constitution, and its interpretation." Until now, a series of design interventions have been conducted where various co-archiving practices have been prototyped and reported on

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(see e.g. Nilsson, 2015, 2016; Nilsson & Barton, 2016; Nilsson & Ottsen Hansen, 2017). The first phase of the project had a focus on marginalized urban communities and neighbourhoods and resulted in six co-archiving practices designed to invite communities to collect, store and share their memories and cultural heritages: Eat a Memory, Plant Your History, The Memory Game, Soil Memories, Mosaic of Malmö, and Designing an Archiving Practice Using Comedy (Nilsson, 2015, 2016).

In the second phase of the project, our focus shifted towards refugees seeking asylum in Sweden (Nilsson & Ottsen Hansen, 2016; Nilsson & Barton, 2016). The shift was a reaction to the current world situation, where many people have been forced to leave their homes in war zones and seek protection in other countries. In 2015, nearly 163,000 persons sought asylum in Sweden (Swedish Migration Agency, 2015). A collaboration was initiated with the *Refugee Documentation Project* run by the three largest museums in southern Sweden aimed at documenting the emergent refugee situation in Sweden (Nikolić, 2016). Building on their experiences as well as on learning outcomes from previous design interventions within the co-archiving research theme, the *Co-archiving Refugee Documentation Project* was established. The aim is to design co-archiving practices for inviting refugees to share and document their experiences from their point of view and not through the lens of the "other", that is, those who gather the documentation, interview, filter, select and archive. The target group for these co-archiving practices is not only the unheard, in this case, refugees, but also the archivists and museum professionals who are interested in assuming a co-archiving facilitation approach by engaging the subjects (the "archived") in the shaping of archives (Nilsson, 2016).

This paper reports the development of a method for increasing the participation in archives, referred to as the *Co-archiving Toolbox.* It includes a set of archiving practices designed to be applied at temporary refugee housing but could potentially also be used in other contexts. The main focus of this paper is to present the toolbox, the co-archiving practices it houses and how it can be used in the field. The specific design activities conducted in the four workshops are briefly introduced and will be more thoroughly presented and reflected upon in future writings.

1.1 Design as a Catalyst for Change

In regard to the conference theme, *Designing social innovation in cultural diversity and sensitivity,* we believe that our project can serve as example of how design interventions can contribute to developing and changing existing archival practices by encouraging archivists and museum professionals to assume a collaborative approach. This is not to say that these professions are *not* working in an inclusive way to ensure diversity in our archives because many are, but rather, in our work, we wish to explore what parallels can be drawn between the practices of co-designers and archivists/museum professionals and how these two domains can work together to reconfigure archiving practices, prototype alternatives and address the complex challenges of democratizing access to and participation in archives. As mentioned, to have access to and be able to participate in the archives reflects political power (Derrida, 1995). In a democracy, we ought to ensure that all groups are invited to contribute to the archives and constantly re-think and develop new approaches, methods and practices for achieving this.

2 Background

2.1 Archiving for diversity

As stated in previous work (see Dunbar, 2006; Warren, 2016; Johnstone, 2001 in Nilsson, 2016; Nilsson & Hansen, 2017), an ongoing debate in the field of archival studies is addressing the underrepresentation of marginalized communities in archives and how we can possibly provide the future with a more representative record of human experience. As argued, instead of continuing to document the "well-documented", archivists and museum professionals ought to be encouraged to assume a more inclusive approach and open up the archiving process to ensure increased diversity in our archives. However, this discussion is nothing new. In the 1970s, archivists were encouraged to

become “activist archivists” striving to represent all people and communities by going from biased archival records to more representative records of human experience (Johnstone, 2001).

As emphasized by Manoff (2004), “The writing of history always requires the intervention of a human interpreter” (ibid, p. 16). We ought to recognize that the historical record is not an objective representation of the past but rather a curated selection of objects that have been preserved for various reasons. The silence and the absence of material and documents in the archives also speak to us.

2.2 The Refugee Documentation Project

The three largest museums in southern Sweden are currently running the *Refugee Documentation Project* (Nikolić, 2016), through which they have documented and now share a wide collection of refugees’ stories and experiences. They have also collected testimonies from the many volunteers and activists who participated in welcoming the people arriving to the city of Malmö in the autumn of 2015. Previously, the documenting and archiving process followed well-established practices from the field of ethnology (e.g. participatory observations, interviews, video and audio recordings, and questionnaires). Their documentation processes resulted not only in much archival material but also in new research questions dealing with methodological challenges regarding matters of inclusion and representation when documenting crisis situations (Nikolić, 2016). In what ways can we develop approaches, methods and practices for museological ethnology characterized by an inclusive approach inviting people to directly share their experiences?

2.3 The Co-archiving Refugee Documentation Project

The *Co-archiving Refugee Documentation Project* is based on the questions that arose in the museums’ work with the Refugee Documentation Project in addition to the outcome of the previous co-archiving design interventions. The aim of the project is to set up a co-design process which invites both refugees and museum professionals to take part in developing new ways to document and archive refugee stories – told in their own voices and through their own perspectives. As well as elaborating on new practices for museological ethnology, we also explore how prototyping and co-design approaches can become a resource in re-thinking the role of archivists and museum professionals who are interested in assuming a co-archival facilitation approach.

In addition to the project introduced above, two more design projects have been conducted as a part of the overall project run by Master’s students in Interaction Design. The first project was as part of a course in collaborative media and resulted in a collection of concept ideas: *StoryMap*, *Conversation Archiving*, and *StoryBox*, which are co-archiving practices that allow communities to capture their experiences from their own perspectives (Living Archives, 2017). The second design project was a Master’s thesis project where a collaborative self-archiving system for vulnerable groups was co-designed and explored (Dimitrova, 2017). In addition to the Co-archiving Toolbox concept, both projects served as inspiration and have contributed to the outcome of the design process described in the following section.

3 Research approach and methods

The research approach taken is that of design research, which has its roots in action research (Agyris et al. 1985), which, since the beginning, has been about creating alternative futures and supporting democratic changes by involving the users in collaborative (co-)design processes. An emphasis is placed on the political motivation and the ethical standpoint that those affected by design ought to have a say in the design process. The focus has been on the overall belief that inviting the user “into the design of invisible mediating structures around them” (Light & Akama, 2014, p. 153) will result in more sustainable solutions and a more democratic future. Thus, the direct involvement of the users is one of the central principles of participatory design and co-design approaches. Instead of designing *for* the users, the designers and researchers co-design *with* the users in a process of joint decision-making, mutual learning and co-creation (Simonsen & Robertson, 2013).

Accordingly, our research process was guided by the principles and methods from the field of participatory design (Simonsen & Robertson, 2013). The workshops conducted as part of this project were designed to support collaborative inquiry, joint explorations and mutual learning between the participants. This was achieved through the use of various generative tools (physical things that people use) and techniques (the ways in which these tools are used) (Sanders & Stappers, 2012). The concept of generative tools refers to "the creation of shared design language that designers/researchers and other stakeholders use to communicate visually and directly with each other" (ibid., p. 20).

By applying a selection of generative tools and techniques, the participants were able to articulate and translate their ideas, needs and interests into tangible articulations: photos, texts, sketches, prototypes. Such design practices can be viewed as a translational process for expressing meaning in different languages, materializing different possibilities, and providing a form of connection between the participants (Callon & Latour, 1981). The framing and re-framing of the problems or challenges are not carried out solely by one participant but rather in a reflective conversation between the participants, where doing and thinking are complementary (Schön, 1987).

3.1 Tools and techniques applied

Various generative design tools and techniques were applied at the workshops. During the week leading up the first workshop, we invited the participants to be part of a sensitizing activity consisting of a small documentation exercise. The participants were asked to document four small fragments of their everyday life by answering four simple questions sent via text message. The belief is that engaging the participants with the topic in advance will cause them to become more sensitive to their awakened memories and associations and thus come more prepared to the workshop (Sanders & Stappers, 2012). The collected material was used at the first workshop to set up productive communication between the participants and level the field between the two groups. The material was applied in a mapping activity, which was about making sense of the fragments of information they all had been part of generating.

In addition to the sensitizing exercise, the participants were asked to bring a personal item that they, for whatever reason, would like to keep for the future (e.g. an object, a document, a photo, a sound, a scent, a book). The purpose of the activity was to prompt the participants to connect to, express and articulate what is meaningful for them to preserve and archive. The activity was aimed at supporting them as they access and articulate their underlying values. The outcome also served as a basis for, and provided input to, the subsequent workshop activity, which was about ideating solutions and future practices for how to capture and archive these categories of memories. Materials and the surrounding physical environment matter in creative and collaborative processes (Sanders & Stappers, 2012); thus, various kinds of creative materials were provided – paper, pens, scrap material, photos, Lego. A trigger set (ibid.) was also developed and provided to help the participants express their ideas or to trigger ideas by providing concrete inspiration.

Building on the outcome of first workshop and after analysing the collected data, seven early concept ideas were developed. During the second and third workshops, these ideas were introduced to the participants for them to react upon, evaluate and re-design. They were presented on posters and were open for adjustments and further sketching (with various sketch materials provided). The ideas were introduced then followed by an evaluation exercise conducted individually and followed by a common discussion about potentials and problems. This setup allowed the participants to oscillate between individual reflection and collective creativity. Through this process, the ideas were either rejected or re-designed, and new concept ideas also emerged.

We compiled the outcome of the three workshops, and the concept ideas were materialized in a cardboard prototype, which was presented at the fourth workshop. This prototype was to be understood as an articulation of potential design solutions (Lawson, 2005) open to further iterations and as a foundation for discussion. In addition to trying out and reconfiguring the prototype, the

participants were also asked to develop a first draft of a praxis around using it in the field. They were given a set of tools to support their process – a timeline and various scrap materials – and were instructed to identify important matters to consider before, during, and after using the concept in the field.

4 The design process

4.1 Research setting

Four workshops were organized which invited museum professionals and refugees to take part in a co-designing process. Workshops 1–3 involved four members of the Refugee Documentation Project (two females and two males) and four refugees (all female) who originate from Eritrea, Afghanistan, Albania and Kosovo and live with their families in temporary refugee housing in southern Sweden. The refugees had arrived to Sweden nearly two years ago to seek asylum and are still waiting to hear from the Swedish Migration Agency. The fourth workshop involved eight museum professionals. Seven of them were new to the project and had not taken part in the previous design activities. One was involved with the Refugee Documentation Project group in addition to initiating the workshop, where she invited colleagues to join from the museum where she works.

The workshops 1, 2, and 4 were held in the facilities of the university, and workshop 3 was held at the temporary refugee housing. On average, the workshops were 3 hours long and were conducted over the course of 3 ½ months. In addition to being photographed, the sessions were also audio- and videotaped.

4.1.1 Ethical considerations

Our work follows the ethical standards as formulated in Codex rules and guidelines for research in Humanities and Social sciences (The Swedish Research Council, n.d.). The participants were informed about the research projects before participating and were freely willing to participate. In connection with the workshops, the participants were orally informed about their rights, that their contributions were to be treated anonymously, and that the gathered material (sketches, video, audio, photographs) would be used for research purposes only. The participants in workshops 1–3 were asked to sign a Letter of Consent. In workshop 4, the participants gave oral consent to take part in the project.

4.2 Four workshops

4.2.1 Workshop 1

The focus of the first workshop was *Envisioning the Archive* where the design activities focused on enabling the participants to access and share their personal values and identifying relevant themes they found important in regard to sharing their stories and communicating who they are. Four museum professionals and four refugees participated in the workshop.

The design activities also focused on creating a common ground for the two groups of participants. At the workshop, we gained insight into how different objects could hold different meaning in the personal archive. This resulted in six design principles – insights that more concretely related to how to actually design for this specific context and purpose. Three opportunity statements were formulated providing focused challenges to work with:

– How might we capture and preserve the refugees' experience of waiting?
– How might we capture and preserve the refugees' dreams for a possible future?
– How might we capture and preserve the individual behind the number?

Based on these insights, seven proposals for co-archiving practices were developed.

Figure 1 Design activities at the first workshop.

4.2.2 Workshop 2

The second workshop focused on *Doing the Archive* and aimed at facilitating the evaluation and re-design of concrete co-archiving practices. The seven co-archiving practices building on the outcome of workshop 1 were presented, and four museum professionals participated.

After having presented the concepts, we asked the participants to individually evaluate them by placing stickers on the concept idea description posters (i.e. pink = idea with potential, blue = bad idea). This was followed by a joint discussion about the potentials and problems with the concepts, whereby the ideas were either rejected or else re-designed. In addition to the seven presented practices, one additional concept idea was generated as a result of the discussion.

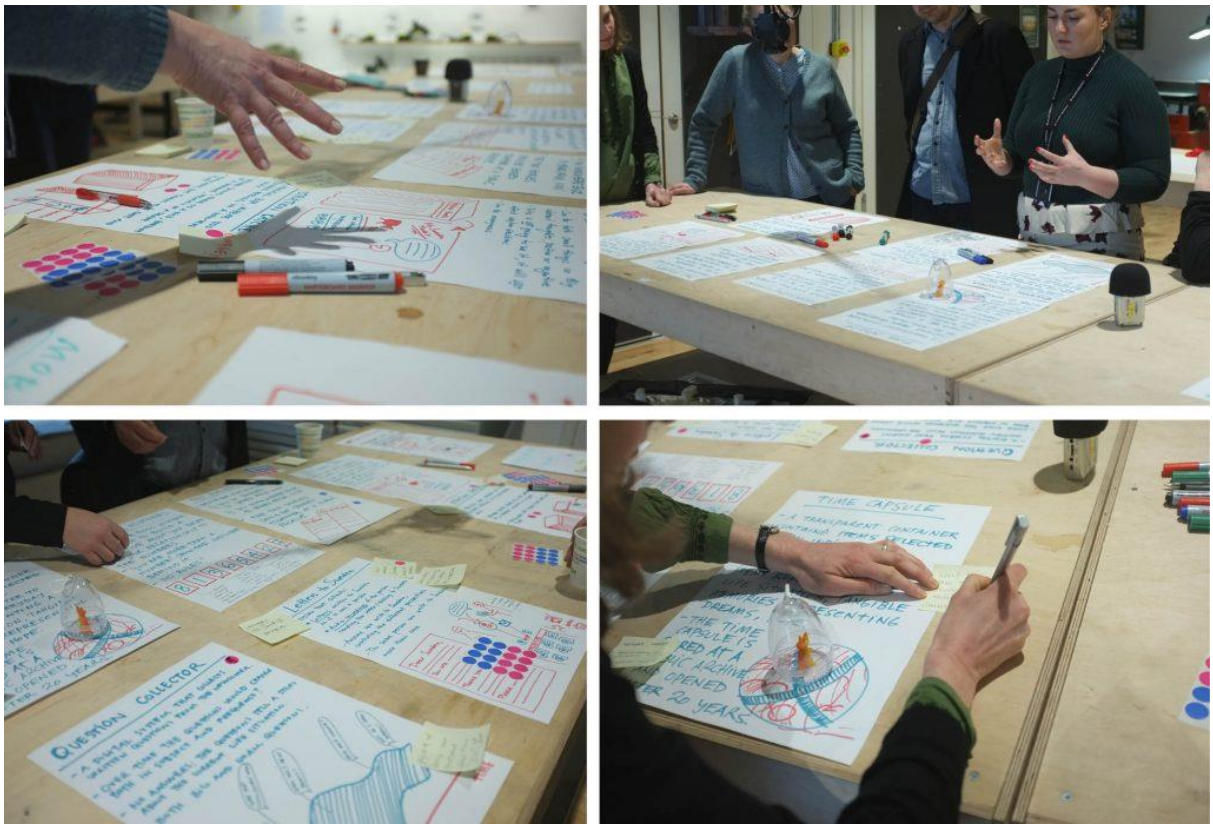

Figure 2 Concept ideas evaluated by the museum professionals at the second workshop.

4.2.3 Workshop 3

The third workshop followed the same setup as workshop 2. Eight co-archiving practices were presented, evaluated and re-designed. Three refugees participated in the workshop.

When comparing the results of workshops 2 and 3, it became clear that the museum practitioners and the refugees did not share the same viewpoint. The practitioners rejected some of the concepts which the refugees found promising and vice versa. However, both groups saw potential in four of the concept ideas. Also, an important insight from workshop 3 is that the human factor is important in archiving – both for the archivist and the museum professional, as well as the "archived". This would argue for creating co-archiving practices that do not stand on their own but rather are activities that both archivists, museum professionals and refugees could collaborate on together.

Figure 3 Concept ideas evaluated by the refugees at the third workshop at the refugee housing.

An overview of the workshop activities and results is presented in Figure 4. These insights served as a basis for the next step of the design process, which was to build a prototype to be evaluated and tested in workshop 4.

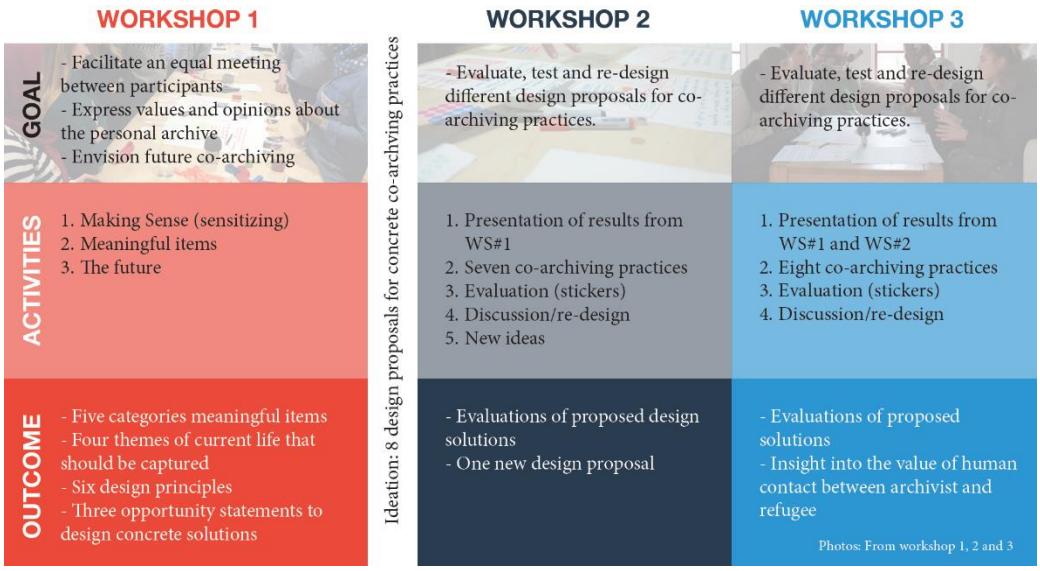

Figure 4 Overview of workshops 1–3: The design activities and their results and insights.

4.2.4 Workshop 4

Building on the learning outcome of the three workshops, a cardboard prototype of a co-archiving toolbox (described in the following chapter) on a 1:1 scale was produced as well as materials for the co-archiving practices that the toolbox would contain. Eight museum professionals participated in the workshop.

The participants were asked to describe the process of using the toolbox in the field, following a series of steps from preparing the toolbox, introducing the toolbox, collecting the material, to concluding the archiving session (see Figure 6 below). The participants were also asked to develop a draft of a handbook about how to implement and use the toolbox.

5 The prototype: Co-archiving Toolbox

Based the workshop results, a physical co-archiving toolbox was developed and prototyped which contained a collection of co-archiving practices.

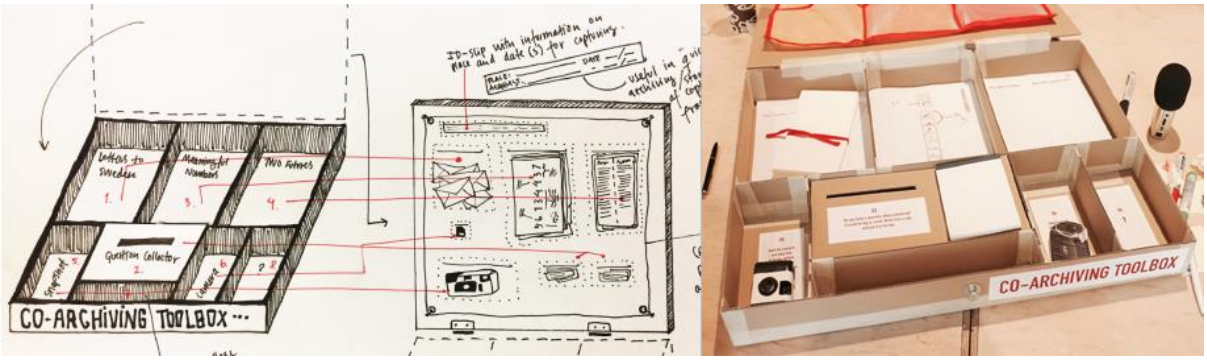

Figure 5 Sketches and cardboard prototype of the co-archiving toolbox.

The toolbox was created for archivists and museum professionals to use when collecting material in the field, in this case, a temporary refugee housing. The toolbox should be portable and "leavable", with built-in instructions. It should have a removable inset for collecting and organizing the content. The toolbox is meant to be administered by a public institution (a museum or an archive) and be placed at a temporary refugee housing for a period of two weeks. The people living there are to use the co-archiving practices included in the toolbox to document their life situations, hopes, dreams, fears, happiness levels and frustrations with little interference from the institution. When the period is over, the toolbox and all the material generated is to be picked up by the museum or archive and curated by an archivist who will then add it to their collections.

The toolbox currently includes seven co-archiving practices (introduced in the following chapter). The practices are designed to be open-ended, which means the refugees have a large degree of freedom to decide how they want to use them thus enabling them to participate in defining how their own stories and everyday lives are captured, recorded and archived. Some of the practices are for independent use, while others need facilitation and encourage social engagement. Some are more structured, while others are very open-ended. The practices generate archival material of different media formats: text, video, still images and audio.

The museum professionals who participated in workshop 4 developed a first draft of a timeline of how the toolbox should be deployed in the field. The co-archiving toolbox should come with a handbook for the archivists and museum professionals to use when planning and facilitating the co-archiving process which involves preparing, executing and concluding the work.

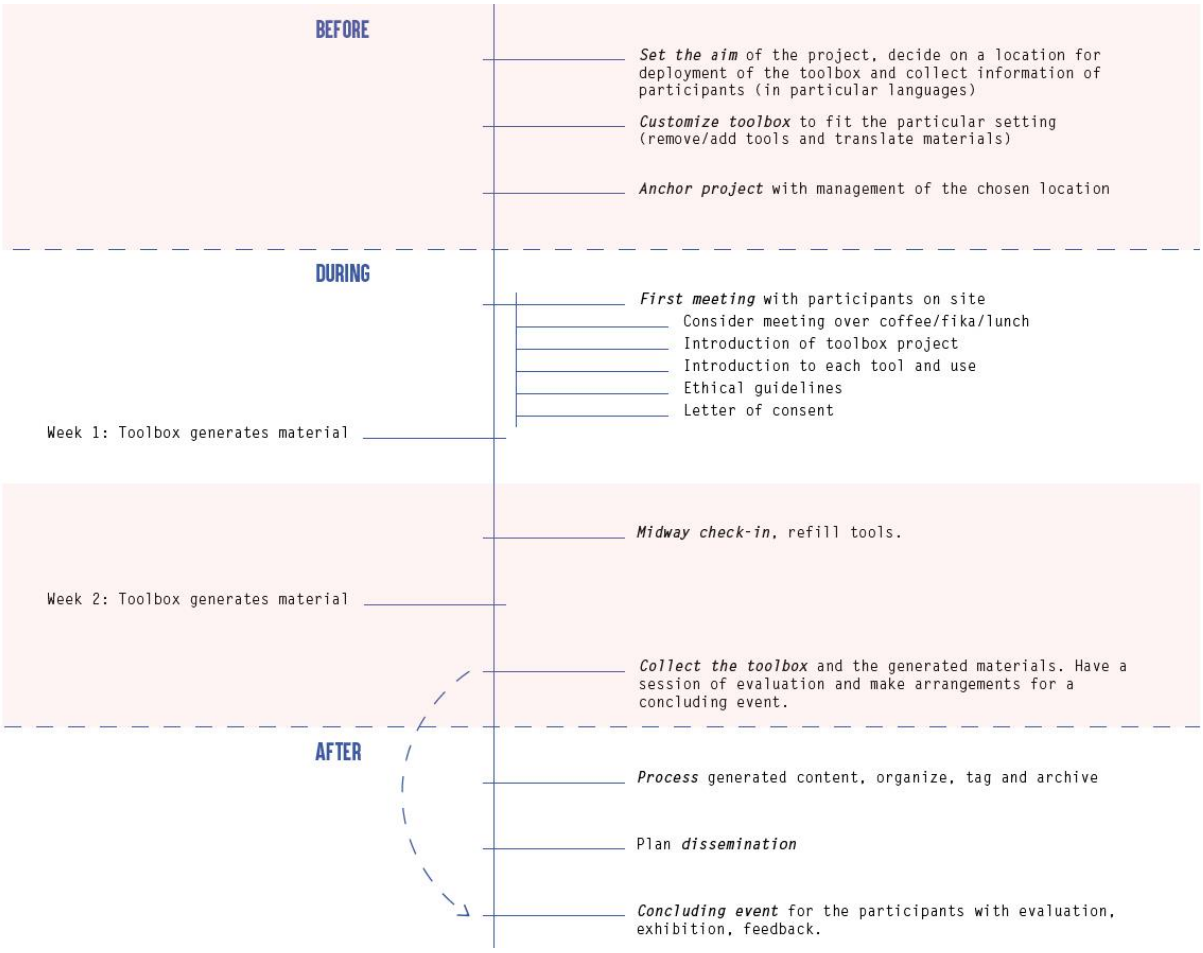

Figure 6 A timeline for how to use the co-archiving toolbox in the field.

5.1 Seven co-archiving practices

1. Letters to Sweden

The Letters to Sweden practice collects letters written to Sweden as if Sweden was a person. This may also involve audio recordings of the person reading the letter/talking to Sweden. The instructions given to the author are simply to "Write a letter to Sweden and put it in an envelope". The authors may (optionally) mark the letter with an ID number to match with other documents and archival material generated about that individual, which will then be stored in public archives (such as documents from the Swedish Migration Agency).

2. Question Collector

The Question Collector collects written questions from the refugees. The questions are open and may range from trivial, smaller, everyday questions to bigger, more meaningful questions about life and the future. The aim is not to answer the questions (and this ought to be carefully communicated) but rather to generate an alternative story about the life situation of the individuals. The instructions given were, "Do you have a question about something? It could be big or small. Write it on a note and put it in the box".

3. Meaningful Numbers

This practice encourages the refugees to "hijack" their dossier number (ID number at the Swedish Migration Agency) and use it to build a narrative about themselves. There are no rules – the individuals may associate their lives to the numbers in any way they find meaningful (e.g. special dates, street numbers, sizes). The narrative could be attached to the official documents about the individual being archived as a strategy to show that a human being exists behind the numbers.

Instructions given: “Tell your story with your ID number. Write your number on the paper and write notes about what the numbers mean to you.”

4. Two Futures
In this practice, the author is asked to describe two possible futures: 1) “Me in Sweden year 2027” and 2) “Me somewhere else in year 2027”. The two versions of the future scenarios should be attached to each other. The authors may (optionally) mark the letter with an ID number to match with other documents and archival material. Instructions given: “What do you see in your future? Describe what your future would look like in 10 years if you stayed in Sweden and if you had not.”

5. Snapshots
The participants are asked to take a series of photos of everyday life. A disposable camera is provided to take the pictures, which should then be passed on to the next person. Instructions printed on the camera: “Take five pictures of: 1) You, 2) a friend, 3) a meal, 4) a quiet place, 5) a noisy place, and pass it on to someone else.”

6. Moving Images
The participants are asked to self-organize documentation sessions and record them with a video camera. A film director among the participants in the group is to be recruited and made responsible for the camera as well as for filming. A list of instructions is given to the filmmakers that suggests topics for film scripts such as ‘share a story’, ‘sing a song’, ‘film everyday life’ and ‘have a group discussion’. Only those who have signed the letter of consent form ought to be filmed. Instructions given: “Shoot a movie about your life where you currently live. You decide what the film should be about.”

7. Audio Memory
A phone number is provided that the participants can call and record an audio message about anything that they wish to share. The receiver of the message and how it will be used and stored ought to be carefully communicated. Instructions given: “Do you have something you wish to share? Call this number and leave a message.”

5.2 Testing the toolbox in the field
We are currently planning the testing of the toolbox in the field. This will be carried out in collaboration with the project members of the Refugee Documentation Project. The test plan is currently in development; in addition to testing the co-archiving practices, it will also include activities that generate content to the handbook that will accompany the toolbox.

Based on the insights from test sessions and from engaging with the users, the toolbox will be iterated and re-designed. The final goal of this project is to produce a completely open source co-archiving toolbox where the physical box (files for replicating the build), with all its materials and the handbook, are made available to digitally download and re-produce.

6 Concluding words
An important insight gained at the workshops is that the generative tools introduced to the participants indeed provided a form of connection between them (Callon & Latour, 1981). When preparing for the workshops, we put much effort into selecting a relevant set of tools aimed at creating conditions for the two groups of participants to meet on equal terms. One example is the sensitizing activity introduced during the week leading up the first workshop. The material generated from that activity was used at the workshop to set up productive communication between the participants and level the field between the two groups, and everyone brought something to the table, so to speak. When describing their individual contributions, the participants were also given space to introduce themselves and compare the variety of material generated. Although some of the participants found the exercise too open-ended and perhaps not concrete

enough, it gave them the opportunity to connect and relate to each other through the shared experience of being part of the documentation exercise.

As part of this project, we also aimed at exploring how design research and co-design approaches could cross over into other domains and become part of developing practices in these fields. Through collaborative design work between the museum professionals and the refugees, we reconfigured archiving approaches and explored alternatives through design interventions and prototyping. One important learning experience gained from our collaboration with professionals who spend their days building archives thought to be representative collections is to acknowledge their work and not appear as though co-design brings in an approach that does not already exist. Our project is not meant to point out what the museum professionals do or do not do, but rather it is about creating conditions for people who come from different communities of practice to learn from each other via different ways of working, and as a result, come up with alternative and hopefully improved solutions to societal challenges. This is why the collaboration with the Refugee Documentation Project was established in the first place, but it ought to be better communicated to avoid misunderstandings. In our case, this mistrust was removed, and the discussion that ensued became greatly valuable, as the museum professionals were able to voice many concerns and thus share valuable insights into their practice and work.

As argued (Dunbar, 2001; Warren, 2016), contemporary archivists and museum professionals ought to assume a more inclusive approach to ensure increased diversity in public archives. This project is ultimately about transforming the cultural practices of archiving, and potentially, the writing of the history of our times as the result of an increase in the diversity of public archives. Given that we are still in the process of testing the co-archiving toolbox in the field, the potential of the toolbox to encourage archivists and museum professionals to assume a co-archiving approach and work in a more inclusive way is too early to evaluate. It is also too soon to determine whether the co-archiving toolbox will afford the possibility to capture alternative refugee stories and experiences, as we have yet not captured enough material to conduct a proper analysis. Based on the reactions from the workshop participants, the toolbox itself as a methodological approach that creates conditions for diversity is promising but will prove itself once put into practice. However, what is certain is that the prototype can be used as a practical example of what a co-archiving approach might entail as well as a contribution to the discussion about re-thinking the “archival mission”. It also holds the potential to contribute to the discussion of how new practices for museological ethnology can be designed (Nikolíc, 2016) and how crisis situations may be documented by using methods characterized by an inclusive approach thus creating conditions for diversity.

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Understanding Situated Energy Values in Rural Kenya

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Off-grid energy systems are facilitating new forms of energy production and consumption. Independent from national grids, they can be installed in more ad-hoc ways and have the potential to generate profit not only by selling energy but also by collecting data about their users and environment. As such, they present new challenges and opportunities for the design of services and interactive systems, which require new understanding of what is relevant to the diversity of people who rely on these systems for power. In this paper, we report on an interview and probe-based study carried out in a rural area in Kenya. The study looks at personal energy narratives as well as the way people value appliances and energy-related services. It reveals how values influence perception of energy needs, the blurry boundaries between business and home contexts, and how widespread narratives of profit creation based on appliances may conflict with communal interests and aspirations of energy users.

electric mini-grid; rural electrification; business development; understanding people

1 Introduction

An increasing number of companies are starting to provide "off-grid" energy solutions for those who have no access or decide to remain outside national energy networks. One way of doing this is through mini-grids, a form of off-grid system that involves small-scale electricity generation (10 kW to 10MW), often powered by diesel or solar energy, and which serves a limited number of consumers. Mini-grids can collect real-time data through individual meters and provide a detailed description of customers' energy use and payment patterns. The small and more flexible scale of mini-grids, combined with data gathering capabilities and increasing connectivity via accessible mobile phone networks, digitalisation of devices, and new possibilities for distribution, provide new challenges and opportunities for the design of energy applications and services.

This study focused on understanding the needs and values of people who are directly or indirectly affected by mini-grid services, particularly focusing on a specific rural area in Kenya. The study was part of an 8-month UK-based project to understand how value is and could be created through energy data in developing countries. It was carried out in partnership with Steama.co a technology company that provides remote management and monitoring of off-grid energy services. Although

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Steama.co's current business revolves around technology, the company retains direct management of a number of mini-grids in Kenya, which were established as test beds for experimentation on social and technological aspects of future energy access and services. The company was interested in understanding the community in order to provide new services and balance supply and demand of its mini-grids. In particular, they wanted to a) design flexible tariff services for different users, b) consider opportunities to finance new services and appliances for their customers, c) understand how these appliances and services could help people develop energy-based businesses, and d) support financing of further mini-grid developments.

Steama.co's interests were in line with development programmes that focus on ways to increase use of energy and the types of energy available (Hanna & Oliva, 2015). Energy provision is widely considered essential for economic growth (UN Resolution, 2015). Consumption, however, is often regarded linearly, based on models of western developed countries. Energy studies tend to look at how people progress up an energy ladder (e.g. Kammen, 2015), moving from biomass to cleaner and more efficient fuels and acquiring appliances that rely on electricity (van der Kroon et al., 2013). There is a general assumption that more energy consumption is intrinsically positive. As in technology for development discourses (Bidwell, 2016; Turner, 2015), these ideas are strongly influenced by pre-conceived Western models and values, which can potentially limit exploration. We argue that the metaphor of linear progression of consumption, which starts from no consumption and moves towards a reproduction pattern of developed contexts, limits design exploration. Rather than looking at multiple aspects of energy in use, possibly leading to the consideration of radically new systems, the linear progression limits exploration and locks imaginaries into established outcomes.

Furthermore, this narrative bias may compromise studies, as it influences surveys and provide a specific framework for interpretation of trends. Inspired by research that looks at energy usage in practice (Bidwell 2013; Shove & Walker, 2014; Pink et al., 2017), mostly in developed contexts, we set off to understand how energy is situated in the lives of people with little access to it, considering histories and expectations towards the future. In particular, we aimed to understand how people in a rural area in western Kenya perceive their energy consumption, how they create personal and business value around appliances and energy-related services, both within and beyond monetary transactions. As presented by Pink et al. (2017) value is highly situated and does not necessarily correlate to how much energy is consumed.

Our study also attempted to balance time and resources available. Resources restricted the study to two 3-4 day visits, which eliminated the possibility of long-term ethnographic research. In Design, cultural probes (Gaver et al. 1999) are often employed to remotely gain insights from groups. In line with current critique of the use of probes in developing contexts (Soro et al., 2016), we opted for a mix of interview and probe-based approaches. The mixed approach allowed us to engage with a diverse group, revealing blurry boundaries between home and business, as well as how individual values influenced perceptions of energy needs, and how widespread narratives of profit creation based on appliances may conflict with communal interests and aspirations of energy users.

2 Related Work

Related work can be situated in thematic areas such as energy infrastructure, usage and consumption; design for development; and alternative "research for design" methods.

Over the last decades, researchers in the social sciences have widely employed qualitative methods to understand energy usage in the home (Shove, 2003; Wilhite, 2005; Henning 2006; Nader 2006). More recently, Shove & Walker (2014) have analysed energy supply and demand as part of the reproduction of bundles and complexities of social practice. Kuijer & Watson (2017) looked at historic developments of energy usage in the UK, and Pink (2011) investigated multisensoriality as part of an agenda for doing ethnography of domestic energy consumption practices. Research on energy consumption in developing contexts, as mentioned above, is widely focused on direct

applications rather than more complex values involved. Exceptions include work by Bidwell et al. (2013) which looked at how the practice of walking to the charging station in South Africa connected routines in using, storing, sharing and sustaining resources, and contributed to aspects of sociality, social order and perspectives on sustainability.

In HCI and Interaction Design, most research on energy perception and use has focused on energy-abundant and wealthy contexts, as criticised by Dillahunt et al. (2009). Several studies have attempted to understand people's perceptions of energy consumption based on the assumption that providing more information would lead to more sustainable attitudes (e.g. Fitzpatrick & Smith, 2009). However, the impact of knowing one's energy consumption has been debated (e.g. by Nilsson et al, 2014; He et al. 2010; Pierce et al. 2010; Buchanan et al. 2015), and recent work has focused on other ways to engage participants, exploring new formats for communication including objects (Broms, 2010), games (Gamberini et al, 2011), apps (Hasselqvist, 2016), and visualisations (Selvefors et al 2013). Through a series of prototypes, Simm et al. (2015) have attempted to create more tangible relationships between people and energy. Dillahunt & Mankoff (2014) have investigated the impact of social engagement techniques, e.g. neighbourhood as a means to encourage energy conservation.

There has been little exploration on interaction with energy data in developing countries, with tangential exceptions (e.g. Zamora, 2016). Recent literature on interaction design and HCI for development, as reviewed by Dell & Kumar (2016), is highly focused on thematic areas such as education, access (especially to Internet), and health, and on the use of mobile devices. There have been many examples of projects focused on communicating information (Wyche & Murphy, 2016) in areas such as agricultural advice (Knoche et al. 2015), market prices (Wyche & Steinfield, 2016) and health advice (Perrier et al. 2015).

Development has been a central theme in design, particularly since Papanek's publication of Design for the Real World (1984). Bonsiepe (1977) classically envisioned design practice "in the periphery" influencing design schools in countries such as India (NID) and Brazil (ESDI). De Laet & Mol (2000) also famously pointed to the importance of a deep understanding of values, traditions and rituals, as well as the need to integrate these values in the design of a system, e.g. through participatory methods. Through a design anthropology perspective, Pink et al. (2017) have investigated energy practices in the home, in developed and developing countries, pointing out how energy infrastructures are implicated in changing configurations of everyday contingencies, inviting designs and interventions that are equally contingent and contextual.

Indeed, research for design has largely moved from traditional methods of surveys and questionnaires to ethnography-based approaches. Given the often-limited resources for research, probe-based methods that allow researchers to collect data with limited or no face-to-face interaction have become increasingly popular. "Cultural Probes" (Gaver et al., 1999) became particularly well-established, with many design researchers extending the method, e.g. to explore nuanced notions of subjectivity and intimacy (Wallace et al. 2013), or to consider artefacts as probes to understand a particular issue (Hutchinson et al. 2003). Soro et al (2016), however, demonstrated problems with applying probes in developing contexts, suggesting a dialogical approach instead, which strongly relates to the approach developed in this study. Traditional methods of personas have been identified as particularly problematic in this context as they provide an image of people that is skewed by the view of those defining the fictitious characters (Cabrero et al., 2016).

Our work contributes to current literature by providing an example of an application of dialogical probe approach to understand a contextual scenario of energy use. It is important to note that rather than focusing on energy conservation and sustainability, the study was framed within the context of business development or, more specifically, on appliance-based business development.

3 The study

The study took place in three villages in Mageta, a 8km-long island in Lake Victoria, Kenya. The first village, Mahanga Beach, was the main location of the study and where the mini-grid was installed. It is more densely settled and has more energy-consuming businesses than the other villages. The other two, Wakawaka and Kamongo, had no central power source at the time of the study, but individual homes and small businesses had their own solar panels.

The main economic activity in the island is fishing. Energy-consuming businesses in Mageta are largely owned and frequented by men. High among these businesses are video halls and barber shops. Women's businesses are primarily food-based, while a few also have small shops or sell goods. The Mageta mini-grid can host up to 68 lines with a maximum output of 6kW. More than half of these lines are currently active and provide power to a combination of homes and businesses. As a small fishing community on an island with a population of approximately 4000 people, even the largest businesses rarely consume more than 5-6kWh per day.

The study was carried out in two visits. Both visits were arranged by the partner company, who facilitated the logistics and contacts. Visits took place over three and four days, respectively, with two months' gap between the first and second visit.

On both visits, we were accompanied by a field operative and the site agent of the partner company. These individuals explained the history and current issues surrounding the mini-grid, introduced us to key members of the community, set up the interviews and probe-based activities, and hosted our entire visit, from coordinating accommodation and meals to providing translation and explanations where necessary. Most of the research was carried out in English, but where participants felt more comfortable speaking Luo or Swahili, translation was provided.

Figure 1. Barber shop and mobile phone charging services in Mahanga beach, Mageta Island, Kenya

3.1 First Visit

The purpose of the first visit was to understand Steama.co customers' relationships with energy. Semi-structured interviews were carried out with nine existing customers and one potential customer of the partner company, all of whom were business owners. Eight were males and two were females. Each interview took about one hour. Participants were selected by the field operative and the site agent based on accessibility, availability, willingness to participate in an interview, ease of communication, and relatively substantial power use primarily for business purposes.

Interview locations were indoors and outdoors, in energy users' homes and places of work. The interviews were documented on paper with marker, in a combination of notes and images, so that participants could see how the information they provided was being recorded.

Participants' lives and experiences were investigated along the following themes:

- Family - structure, number of members
- Business(es) owned and managed - type of business, products/services offered, income and family expenses
- Energy uses in the home and business
- Experience and challenges with energy access and the company managing the mini-grid
- Aspirations for the future - if they had more / better access to energy, kinds of business they would like to develop

3.1.1 Interview insights

All interview participants managed their own businesses, and almost all had multiple sources of income. Businesses included various kinds of shops selling mobile phones, accessories, cold drinks, clothing, etc.; cafes and bars; entertainment venues such as pool halls and video halls; and services including phone charging, haircutting, music downloading, and mobile money (M-Pesa).

The mini-grid served a variety of homes and businesses, although on the first visit we only spoke with people using the mini-grid for business purposes. Their businesses used power for lighting, music (to attract customers to their shop as well as to power their entertainment venues), and various electrical devices, from refrigerators for cold drinks to computers for music downloading to rows of power strips for phone charging. Almost every participant had dimensions of their business that relied on power and other dimensions that did not. They also had aspirations for expanding their businesses that were both energy-dependent and energy-independent.

For example, F.O., a barber, was using electric razors completely dependent on the mini-grid, but had slowly transitioned from fishing to running the barber shop before committing himself completely to the barber shop. He intended to open another shop in another location as well as to buy solar panels for charging wet cell batteries. S.A., one of the more prominent small business owners in the community, was running a video hall that relied on power, but he also sold mobile phones and accessories and operated a motorcycle taxi around the island. Another major businessman, E.O., had significant income from charging phones and music downloading, but he also managed a pool hall, sold high-end (relative to local income) mobile phones, and aspired to own a disco and a boutique selling clothes and jewellery as well as invest in a public service vehicle cooperative. N.O., the owner of one of the largest shops - and the only shop with not only one but two deep freezers (used as refrigerators) - had started out as a hawker, selling goods on the streets. Eventually he earned enough money to set up his own shop. When power first came to the island, he was sceptical - "At that time I was not prepared for that power. In my mind - what I can use for that power?" Then he got the idea to purchase a deep freezer to sell cold drinks and he thought, "Yes, this is the thing that will give me work," despite the fact that, "People were shocked. They didn't know if this thing could bring this power." His future plans were to "have a big shop" selling clothes and shoes, because no one on the island was selling good quality clothes.

Figure 2. Interviews

A number of businesses arose from or were defined by the context. Music and other downloading services were provided by people who had computers and collected various digital files from off the island and transferred them to people's phones or other devices on a pay-per-item basis. People seemed not to be aware of the ability to transfer digital files via Bluetooth. Since most people did not have power in their homes, the video halls played films throughout the day on a pay-per-view basis. Equally, businesses offered phone charging on a pay-per-charge basis.

When we discussed future business development opportunities, some people thought that if the island had a more reliable and larger source of power, many people would come up with new business ideas: "People have so many ideas that they have not said," said S.A. F.O., the barber, concurred: "It would be good if people had that power. If everybody has power, more people would engage themselves in business." This vision, however, was challenged in the second visit, where we interviewed people who were not customers of the partner company. "They say if you use more energy you make more money. I say no. You pay more to the power company. You may get more money, but no profit."

Most participants separated their business and personal financial management to some degree, but personal expenses and financial management issues could significantly impact on their businesses. For example, R.A., a female who had a TV for her customers' entertainment in her shop, kept her electricity account balance very low so that her partner could not watch TV alone in the shop at night and run her account dry. She said, "If I buy more power, someone else can use it and waste it. I want to use power only for business." N.O., the shop owner, said that unexpected illnesses could mean that he would occasionally have to use money that he was planning to reinvest in stocking his shop to take care of his family. He had developed a tactic of keeping a blue plastic cup to safeguard his earnings from selling cold water. Every earning and every expense related to selling water went into and came out of the cup, and he refused to touch that money for any other reason. Through this 'savings account', he was able to purchase a second refrigerator within six months of purchasing his first one. S.A. summed up most people's experience: "Always there is a problem with finances. What you have is less than what you expect or you are spending."

Participants also mentioned desire to access loans to expand their business. Some were able to get loans through the local cooperative of businesses or from a microfinance institution, but many mentioned they could not get capital. G.O., an older and more educated business owner, was the

only person who mentioned getting a loan from the bank. E.O.O. had taken a loan for a music system that he rented out for special occasions, but he was having difficulty paying off the loan, and he had to do other work in order to make the payments. Most participants described saving small amounts slowly over time, often keeping a balance in their mobile money account (M-Pesa).

When asked about their relationships to the partner company, participants expressed a mix of satisfaction with the service at various times and frustration at others, largely dependent on the capacity of the mini-grid. Participants were relatively dissatisfied with the way the company communicated energy usage. They received a notification when their balance was running low and a text message when they added credit to their account that told them how much credit they had added and what their new balance was. Some people kept careful track of their account, such as E.O., who said, “I normally know how much I am using in a day. The day I pay less I will check my balance more regularly to make sure my power will not go off.” Others simply did not understand their power usage: “How come today I topped up 100 KES (Kenyan shillings, £1) and it has not taken me the way it usually does?” asked R.A. Some participants were on a daily flat rate tariff and knew their rate, but they didn’t know how much power they consumed in a day. They also knew that they were paying different amounts to their neighbours, but did not know how much power their neighbours consumed. Beyond these things, if they wanted further information they had to call the site agent or the field operative directly.

The interviews provided initial insights into how energy can help generate business value; however they did not reflect energy consumption in other spheres and were limited in terms of demographics. Interviews conducted were focused on those who were considered by the company as successful energy users and who could communicate easily in English and were seen as able to understand the research and therefore to participate in it. They were also predominantly male. These limitations were addressed in the design and application of probes that were used in the second visit.

Mageta is also a place where many companies have carried out surveys to understand the successful implementation of the mini-grid. Indeed, there was some degree of interview fatigue among staff and customers. As identified by Brereton et al (2014) indigenous communities are relatively wary of being the subject of research. Mageta seems to be Steama.co’s ‘model’ site for understanding usage of mini-grids, and is explored by a variety of organisations and researchers with different objectives. Steama.co’s field operative indicated that there are people coming to visit to observe the mini-grid, make films, conduct interviews, do research and more every two to three weeks. The application of probes would introduce something new in this context.

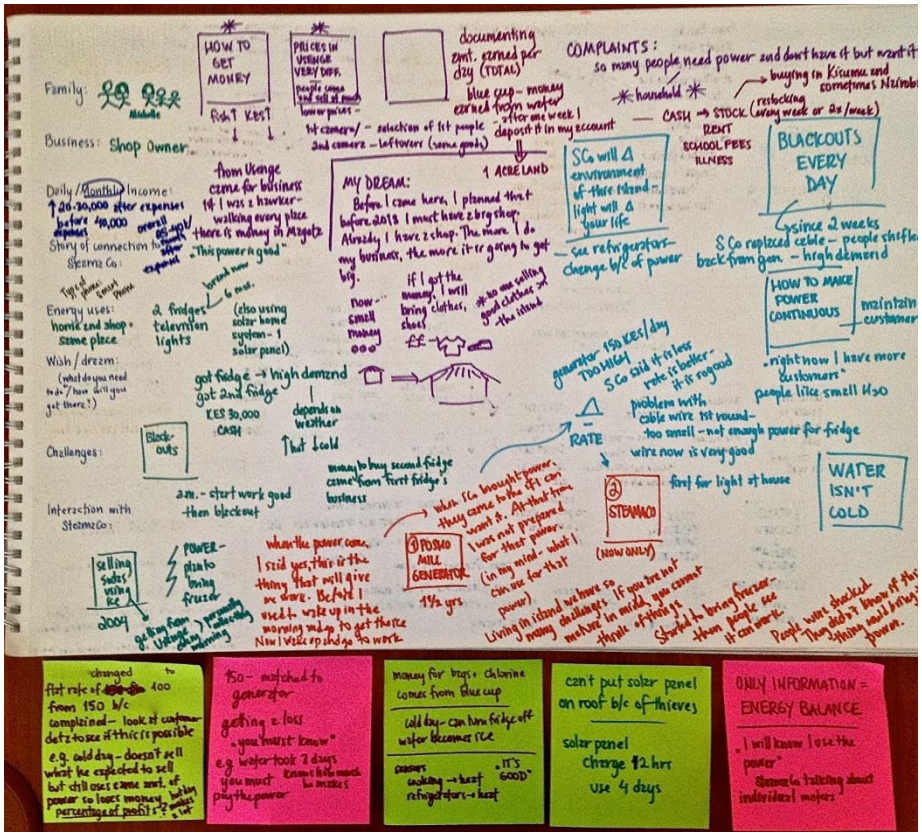

Figure 3. Illustration of interview data

3.2 Second visit: probes

For the second visit we designed two probes to explore value beyond businesses stories. In particular we wanted to understand:

- how people experience and understand their energy usage;
- how they value different appliances, in which context, and how these values are mediated by those who use particular appliances;
- how people understand their own energy consumption, particularly in terms of individual appliances;
- how people understand the value of different services and businesses;
- how values would change if limitations of energy availability were added or removed, in scenarios of scarcity and abundance of energy; and
- how people imagine their personal and communal futures in relation to energy.

The probes were designed to be used in individual interviews as well as in group activities. Despite being the support for interviews, they should be sustained by themselves. They should be straightforward and visual. Interviewers would give verbal directions, ask questions and document responses. Most importantly they should allow active engagement for participants to design their own representations and stories. We finally opted for using stickers and large sheets of paper, where people would build one diagram of appliances and one map of services. Stickers were removable and could be replaced if participants changed their minds.

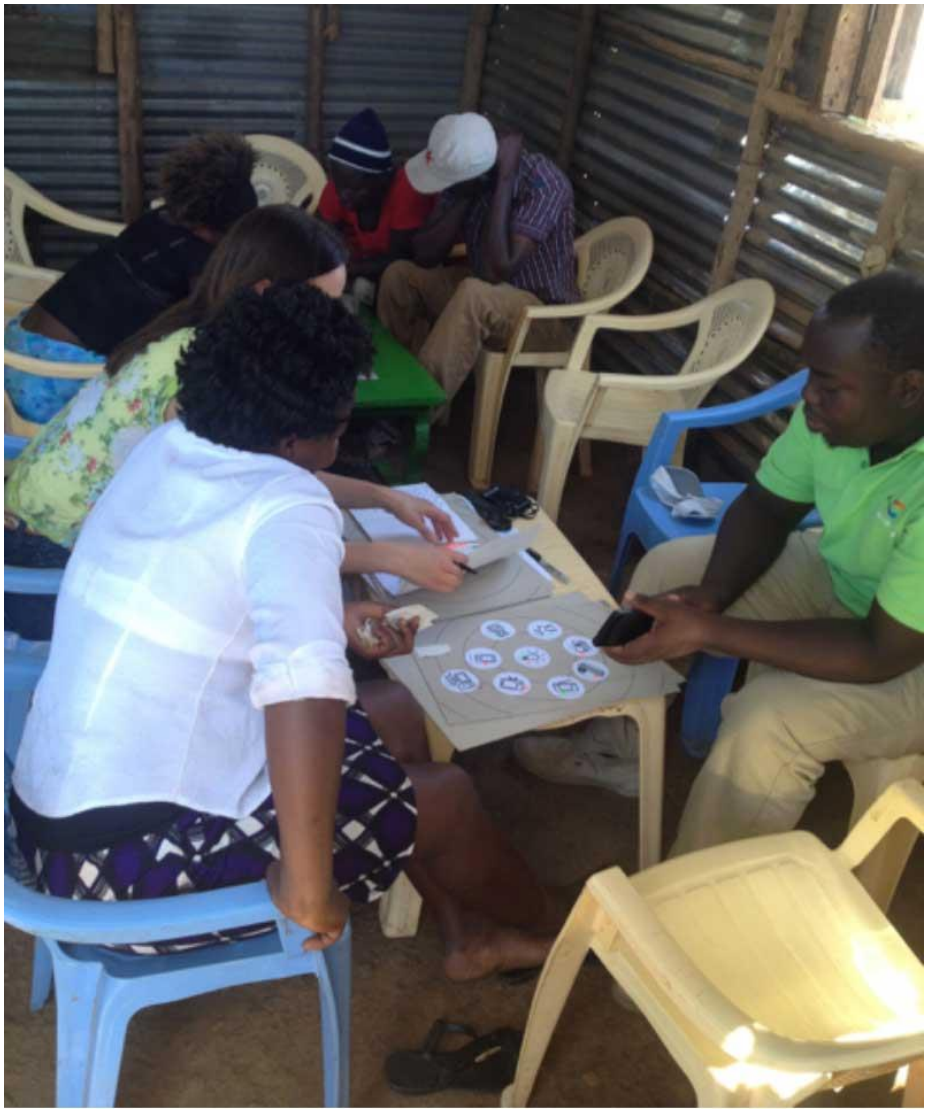

Figure 4. Application of probes

3.2.1 Diagram of appliances

The first probe focused on appliances, the values they mediate, context of usage, awareness of consumption, and appliances participants would like to have in the future (b, c and f above). Based on devices observed in the first visit, and in conversation with the field operative of the partner company, we designed 16 stickers: lamp, mobile phone, laptop, computer, desk lamp, blow dryer, DVD player, electric razor, TV, speakers, router, radio, refrigerator, hand-held video device (a small device with a USB port that can play music and movies), music system (effectively an integrated radio, cassette and CD player and speakers) and video system (a connected system of monitor, DVD player and speakers).

The paper sheet where participants would place these stickers had a diagram of concentric circles that represented increasing levels of importance. Participants were asked to place the most important appliance in the centre of the diagram and then distribute other appliances according to their level of importance, with more important ones towards the centre and less important ones towards the edges.

They were then asked to mark which ones they used at home, which ones they had (if they were a business owner) or would use in a business (if they were not a business owner), which appliances they felt were missing from the diagram, and which ones they would like to have in the future. Stickers with human figures were designed, and participants were asked to place them on the paper

sheet to represent different relationships, and to draw lines to indicate which appliances were used by themselves and which were used by other people. They were finally asked to rank appliances in terms of consumption. Throughout the exercise, they were asked about their motives to place different stickers on the diagram, to draw connections on it and to rank appliances.

3.2.2 Map of services, infrastructure and productive activities

The second probe focused on services and business (d, e and f above). We designed 21 stickers containing services and infrastructure elements. Five were non-profit-making services or institutions - church, home, school, health centre and water. Two, agriculture and fishing, illustrated businesses that are not necessarily reliant on electricity. Eleven corresponded to businesses that we observed in our first visit, and which tended to use power in some way - restaurant, hotel, bar, barber shop, hair salon, music download, download, phone charging, shop, video hall and M-Pesa shop. M-Pesa is the Kenyan mobile money service, and M-Pesa agents manage cash deposits and withdrawals. Internet cafe and shop were future business ideas, as there was no consistent Internet data connection on the island. We also included a sticker representing power itself.

Participants were asked to place the services on the map according to which services they thought were most important for the island, following a general idea of concentric circles, placing the most important service in the centre of the map and expanding outward from there. They were asked if any services were missing from our sticker set and if so, to identify which services we had failed to consider.

After participants had placed all the stickers, we asked them which service they would choose if they could only provide power to one of them. A small sticker with '1' was placed on this service. We then asked them to rank the remaining services in order of preference in terms of distributing power. Based on their responses, they placed additional numbered stickers on the services, from '2' upward. Responses varied among participants; some only ranked a few services while others ranked all of them.

Both probe exercises took from 15 to 40 minutes from each participant, with an average of 20 minutes. Both probe exercises were carried out with 25 participants - 14 adults and 11 high school students. Of these, 12 were female and 13 were male. Six of the adults ran businesses that depended on energy (e.g. mobile phone charging shop), four ran businesses that did not rely on energy, and of the others one was employed as a shop assistant, 2 were fishermen and one was a housewife.

3.3 Probe responses

The stickers and method of ranking by concentric circles were straightforward. The visual medium and the interaction provided by the probes helped to mediate conversation, while raising curiosity. Probes gave participants some degree of freedom in relation to traditional questionnaires. Most carefully selected which appliances they placed on the diagram: "I understand that these appliances exist but I don't want to place them here" (P2). Other participants chose more than one sticker to place in the centre, explaining that ranking one higher would make little sense since they were highly valued in different contexts.

3.3.1 Degree of importance of appliances

Appliances that were placed more often in the diagram, and which were also placed most closely to the centre of the diagram were: 1) lamp, 2) mobile phone, 3) TV, 4) refrigerator. These were strongly related to the ones that were most often owned by participants: 1) lamp, 2) mobile phone, 3) TV, 4) radio. A second group of appliances given a high degree of importance included: DVD system, computer, laptop, music system, speakers, and video system. All other appliances were chosen 5 times or less. The students demonstrated higher awareness of computers than others. Highest ranked appliances in terms of importance among students were: 1) lamp, computer, mobile phone, refrigerator. Appliances that appeared most often in the diagram were the same as in the adult

group. When looking at single appliances that were most often placed in the centre of the diagram, lamp was placed 11 times by adult participants and 8 times by students, followed by computers chosen by 2 adult participants and 3 students, and electric razor, chosen by 3 adult participants.

3.3.2 Future appliances

Top future appliances among adults were: 1) refrigerator (chosen 8 times), 2) video system (chosen 5 times, taking into account both business and the home), 3) blow dryer, electric razor, computer, music system, and TV (all chosen 4 times). Here there were a few differences in responses given by men and women. While both considered future appliances in the context of businesses, a few women also considered future appliances in the context of the home. Three of them suggested that they would like a blow dryer in order to open a hair salon. As mentioned earlier, hair salons were indeed rare in the Island, particularly when compared with barber shops. While most appliances placed on the diagrams were reported to be used at home, most future ones were considered in the context of expanding or considering new sources of income (e.g. a computer would allow participants to start a music download service, for example).

3.3.3 Appliances: level of consumption

Participants were asked to rank appliances in relation to their power consumption. Previous research (e.g. Lockton et al, 2013) demonstrates that people have little knowledge of how much their appliances consume overall. Rather than testing if participants knew how much energy their appliances consumed, the ranking exercise was meant to trigger reflection on how much they have been, would be willing to or imagined paying for using each device.

Top ranked appliances were: TV, refrigerator, lamp, computer, and mobile phone. Choices were influenced by: 1) frequency of usage of different appliances " [Computer] You can switch off a fridge but a computer is running all the time" (P3) 2) knowledge of wattage "Refrigerator needs a lot of power" (P13), and 3) the number of tasks performed by an appliance "Laptop does a lot of things, download music, plays music..." (P4) "Because I use it [mobile phone] in different ways. For light and music, for example." (P7)

Appliances chosen as highest in consumption were refrigerator (chosen by 5 participants) and computer (chosen by 3 participants). All other appliances were chosen first only once. Among students, appliances that were ranked highest in terms of consumption were: 1) computer, 2) TV, 3) lamp, 4) refrigerator, 5) blow dryer.

Figure 5. P8's probes: Indicating importance of appliances in the diagram and illustrating the importance of water in the services map

3.3.4 Services, infrastructure, and productive activities in Mageta: degree of importance

The lack of pre-defined structure of the map sheets allowed participants to creatively express the importance of services. Often, they would just say which they thought were the most important services/activities. Other times they would attempt to illustrate this importance through the arrangement of stickers (see Figure 1). When asked about the degree of importance of different services, participants ranked services that are in the heart of community interests consistently high. Fishing, the main productive activity in the island, was ranked highest, followed by health centre (2), school (3), church (4), and shop (5). Among students, highest rated activities/services in terms of importance were 1) health centre and home, 2) agriculture, 3) school, and 4) fishing.

Considering activities that adult participants chose first, fishing which is central to the island was the only activity chosen more than once (6 times). Other activities chosen only once were: power (P3), health centre (P4), school (P5), home (P6), water (P8), phone charging (P10), barber shop (P12), church (P13). Often, this second choice related to their personal stories (e.g. of sickness), interests

(e.g. the importance of the barber shop), or energy solutions for their personal issues, e.g. water pump to irrigate crops.

3.3.5 Energy supply rank

When asked about services that they would like to provide power to, the top 5 choices among adult participants were 1) health centre, 2) school, 3) phone charging, 4) home, and 5) shop. Home appeared more often in the energy supply context than in the rank of importance. Students would provide energy to similar services/activities choosing the following activities as top 5: 1) school, 2) health centre, 3) phone charging, 4) home, and 5) restaurant. The activity chosen most often among adults was phone charging (which was nevertheless ranked differently in each diagram), and among students it was school, which reflected the importance as well as time spent using these services.

Overall these energy supply choices were influenced by 1) importance for the community, 2) participants' own experience of using energy in different services, 3) thoughts about which services needed light bulbs rather than supply of other sorts of devices, and 4) personal preference. While most participants focused on communal activities when considering the importance of services, personal interests played a bigger role in the power supply-ranking task.

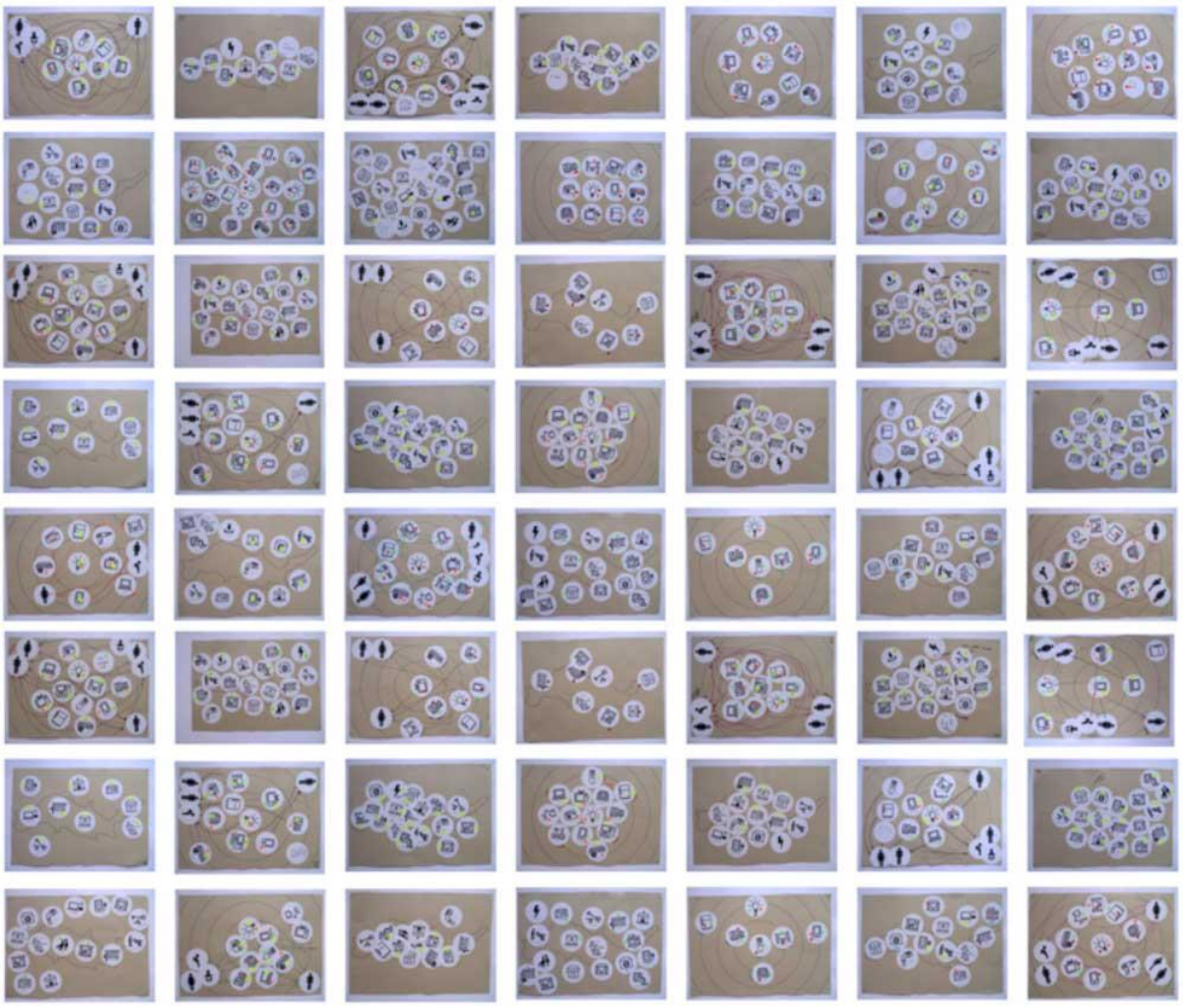

Figure 6. Overview of collected probes

4 Reflections

4.1.1 Reflections on the probe method

The probes provided a tactile, more concrete way to quickly approach participants. Lowering barriers to engage participants, it allowed us to speak to participants of more varied backgrounds, including women and school students, and those who were not direct customers of the partner company or were not seen as potential business owners.

The probes were more suitable to support a conversation around values than traditional questionnaire methods would be. They allowed for more ambiguity and therefore more reflection on the subject at hand. The freedom of placing and repositioning stickers on the map or diagram allowed participants to reflect on what these appliances and services meant. Instead of passively answering questions, they could visualise, define and change the stickers to create their own maps and stories.

Prone to incite curiosity, the probes also invited the opinion of others. Family members, colleagues, and passer-bys would give participants ideas and suggestions on what to place on the map, making it into an instrument of conversation. Finally, it was of great importance that the probes were not simply sent to participants but were used as a starting point for conversation.

4.1.2 Boundaries between home and business and need for appliances

The study drew attention to how boundaries between home and businesses are less defined than often assumed. Electrical appliances used for domestic entertainment were sometimes considered as a way to supplement income. Domestic music systems were hired for community events; refrigerators were desired both to keep food fresh at home and to enable participants to sell cold drinks. Video systems were considered both for opening a video hall and for personal entertainment.

The study also raised discussion regarding the ability of appliances to generate monetary value. Mahanga Beach is characterised by an unusually entertainment-driven culture as a result of the relatively high cash flows brought in through fishing. Talking about the potential of music systems, P1 mentioned: “Most people like music. If you don’t have power, you have no music, and people just go away.” However, while there were already many businesses created based on off-the-shelf appliances, such as barbershops and video halls, new appliance-based businesses would not necessarily guarantee greater income, especially if the owner required a loan to buy appliances to support his or her business. Some participants were indeed critical of the model of value creation through appliances: “Appliances are not essential for a business.” There was a tension between appliances being considered necessary for businesses and gaining customers and the costs incurred in buying and running these appliances. Following energy ladder narratives, which were disseminated not only through energy but also loan and other technology companies, owning appliances still symbolised wealth, and these were desired by most participants.

4.1.3 Values influencing interpretations of energy needs

The results showed general trends toward giving high importance to community services. Oftentimes however, choices were made that represented a certain aspect of the participant personality or belief, which would turn into a conversation point. P7 for instance chose the following options as the most important services in Mageta: 1) fishing 2) school 3) health centre 4) M-Pesa and 5) phone charging. These were services of high importance in Mageta. The participant, however, would opt to supply energy to the Church first because “it deserves”. She was aware that the Church needed less power than other services, and putting the Church in a position of privilege supported her identity as a religious person. P7 also made sure to stress that “Bar” would be her last choice. P6 on the other hand placed home in the centre of the map stating that, “Everyone needs a home, this is where everything starts”. Rather than a necessity, providing energy to a particular service or place was a symbolic gesture of placing this service above others, literally giving power to it.

4.1.4 Communal vs. individual interests

There was some degree of overlap in appliances that people placed in the centre of the map and the services that they prioritised for energy allocation. Most often, however, participants would rank communal services of high importance, to show how much they cared about these services. This ranking was occasionally in contrast to their decision to allocate power to services. In this case, they would prioritise businesses they depended on or personally valued the most, either their own businesses or businesses they frequented more often. For example, P1 placed fishing, church and health centre in the centre of his services map; however, his ranking of energy allocation included downloading, video room and barber shop. Energy-dependent business owners particularly valued their own use of energy over communal ones. P1 explained the motivations for placing lamp, video system, computer, and electric razor in the centre of the appliances diagram: video system and computer referred to P1's own businesses, and electric razor was one of the appliances that he planned to buy in order to start a new barber shop.

4.1.5 Implications for research for design

The reflections above demonstrate the complexity of values that are linked to narratives of development based on energy-supported businesses. From these reflections we draw three main recommendations for considerations in research for design.

a) Ambiguity. The value of ambiguity in design has been largely discussed by Gaver et el. (2003). Here we argue for the integration of ambiguity in the application of methods to explore values. Values are messy and linked to issues beyond the visible and describable, which makes each context unique. Welcoming ambiguity in the application of methods therefore opens up space to embrace such nuances. Open methods allow participants to introduce new themes and conflicting points-of-view, which helps to reveal values that were concealed by what is often considered the "right answer". While many discourses of energy implementation focus on objective needs of a particular community, participants tended to choose services that they personally valued most. In other words, the choice to provide power to different services was strongly connected to a sense of value and emotional attachment, rather than objective considerations. A less open method of structured interviews and questionnaires would probably only identify such issues if set as a hypothesis beforehand.

b) Contextual awareness. In line with Pink et al, this study demonstrates the importance of understanding appliances in context. This is particularly important in developing contexts. Here too ambiguity can play an important role. Rather than trying to strictly define their use, designers can leave value to be defined in the usage.

c) Beyond narratives of development. Rather than looking at narratives of development and energy ladders, we should consider profit models within broader forces of value. It is important to understand commercial motives behind narratives around the introduction of appliances in developing contexts, attempting to explore alternative models.

4.1.6 Limitations of the study and future work

It is important to stress that this study was strongly situated. It focused on one form of provision, a solar mini-grid, and on a small island. The study location was chosen in part for its representation of an extreme situation. The aim of reporting the study was to communicate the potential of applying specific methods to study energy rather than to offer a representative analysis of the larger population of off-grid energy users.

Both visits were carried out in a very short period of time. Extra time would be necessary to gain a deeper understanding of this community. In addition, some people who we had expected to follow up with from the first visit were not available in the second.

5 Conclusion

This study gave us the opportunity to explore people's values around energy in a way that reflected the nuances, complications and conflicts of lived experience. The probes allowed the opening up of space for ambiguity, which highlighted that people's priorities and uses of energy will not necessarily follow assumptions about economically driven decisions. As male and female, business owner and housewife, parent and student, micro-grid customer and unelectrified, their current and future relationships with energy are influenced by their roles and structured surroundings. Those supporting the expansion of energy access can take note as they design systems that will be required to serve a diversity of users and where the systems may shape users' values even as they are shaped by them.

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A Survey of Prosthetic Preferences in the UK and Greece

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People with limb loss are considered as disabled and they are stigmatised. However, the use of prostheses that express their identity has potential to change society's opinion and eliminate stigmatisation. Using an online questionnaire, the aim of the study was to understand users' preferences towards prostheses and whether culture affects them with the aim of designing more suitable prostheses for them. In order to investigate people's preferences, with respect to cultural diversity, the study was conducted in the UK and Greece. There were 136 valid answers. The sample methods of the research are non-probability. Through the demographic and disability related variables that were tested, age and cause of limb loss appear to be independent of culture. The results present similarities between the two countries regarding the hierarchy of the preferences. However, the reasons for participants' preferences towards prosthetic limbs significantly differ; in the UK people are concerned about identity, whilst in Greece the concern is for social reasons. Functional concerns constitute the most important issues to both countries.

prostheses; preferences; culture; stigma

1 Introduction

Sethna and Blythe (2016) describe culture as a "set of shared beliefs, attitudes and behaviours associated with a large and distinct group of people" (p.406) and since culture is something that people learn during their life, it affects their behaviour and habits to a great extent. In order to separate and distinguish the world, people use cultural categories; the most significant are those created in human community, such as gender, age, occupation etc. (McCracken, 1986). The products people use can help them discriminate others into the various cultural categories due to the symbolic meanings they have (McCracken, 1986; McDonagh, Bruseberg & Haslam, 2002).

One way to understand culture is by dividing it into High/ Low Context (Sethna & Blythe, 2016). People who live in High Context (HC) cultures have strong values, attitudes and perceptions, their behaviour is stable and predictable, they can communicate with non-verbal cues and they are collectivist (Würtz, 2005; Sethna & Blythe, 2016). On the other hand, the values, attitudes and perceptions of people in Low Context (LC) cultures can change easily, they communicate with clear

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messages and they are individualist (Würtz, 2005; Sethna & Blythe, 2016). Hofstede (1984) was the first who referred to the cultural dimensions of societies; those of power distance, uncertainty avoidance, individualism/collectivism, masculinity/femininity and long-term orientation (Tsikriktsis, 2002; Yaveroglu & Donthu, 2002). The research that Yaveroglu and Donthu (2002) conducted shows that people who live in countries with high power distance tend towards imitation. People in countries presenting low levels of uncertainty avoidance will be more innovative and easily accept different opinions from their own whilst people in countries with high levels of uncertainty avoidance present higher levels of imitation and will not accept diversity (Yaveroglu & Donthu, 2002). In individualistic societies people act independently and autonomously, are motivated by their personal goals and take individual decisions (Goncalo & Staw, 2006; Yaveroglu & Donthu, 2002). People in collectivistic societies create strong bonds with groups, they are influenced by them and try to maintain the harmony in the group (Goncalo & Staw, 2006; Yaveroglu & Donthu, 2002). Yaveroglu and Donthu (2002) and Würtz (2005) compare Hofstede's individualistic/ collectivist dimensions of culture with Hall's LC/ HC cultures and suggest that the two theories present similarities concerning social interactions.

Table 1 The characteristics of Greece and the UK according to Hall's division of cultures and Hofstede's cultural dimensions (Papadopoulos, 2009).

Countries	Greece	UK
Context	High	Low
Orientation	Collectivism	Individualism
Power distance	High	Low
Uncertainty avoidance	High	Low

Deal (2003) supports that the attitudes people have towards others with impairments are affected by the culture and the type of impairment. Saetermoe, Scattone and Kim (2001) refers to the study that Jaques, Linkowski and Sieka (1970) conducted in three countries and shows that Americans, in comparison to Greeks, present higher tolerance towards people with disabilities. These results are in accordance with the research of Westbrook, Legge and Pennay (1993), which also highlights the importance of culture on the formation of people's attitudes and shows that Germans (individualistic) appear to have the most positive attitudes towards disabled, while the Greek (collectivism) have the most negative, due to the social stigma that easily spreads to the members of the group. The same findings are also derived from the study of Zaromatidis, Papadaki and Gilde (1999), which shows that the culture in which people grow up affects attitudes as Greeks appeared to be more negative towards individuals with impairments than Greek-Americans and suggest that this is a result of collectivism/ individualism. Papadopoulos (2009) points out that Greek-Cypriot who confront mental problems are stigmatised more than British. Additionally, in a comparison between the two cultures, the British appeared to have a less stigmatised view than Greeks although both of them had a negative opinion (Papadopoulos, 2009). The study that Grames and Leverentz (2010) conducted shows that culture and type of disability play an important role in the formation of people's attitudes, since the Chinese (collectivism) present more positive attitudes than Americans (individualism) towards people with physical problems and less towards people with psychiatric disability problems. Although these studies describe Greece as a collectivism culture, the investigations of Georgas (1989) and Pouliasi and Verkuyten (2011) point out that the urban societies of Greece are in a transitional phase from societies of collectivism to individualism.

People with limb loss are often considered as disabled by the able-bodied since their body does not comply with the standards of normalcy of the human body that modern societies impose. As a result, they are stigmatised. Stigma is based on the relationship that exists between the person who

is considered to have a difference and the other people who evaluate and perceive this difference negatively (Green, Karshmer, Marsh & Straight, 2005; Riddell & Watson, 2003; Susman, 1994). From this interaction, there are two types of stigma; public and self-stigma. According to Werner and Shulman (2015), public stigma derives from the opinion of society towards stigmatised people, while self-stigma is a consequence of the opinion that the individual forms, based on society's attitude. Green et al. (2005) and Werner and Shulman (2015) highlight that stigma can also spread to people who are close to those who experience stigma, such as the members of the family and it is referred as stigma by association. Goffman, cited in Susman (1994), reports that normal people try to avoid socialising with stigmatised groups because they feel that stigma will spread to them. This behaviour results in the categorisation of people into desirable and undesirable groups and causes negative feelings towards the undesirable groups, such as emotional distress and depression which lead to social discomfort (Rybarczyk et al., 1992; Werner & Shulman, 2015). These feelings are experienced not only by people with disabilities, but also by the members of their family (Green et al., 2005; Werner & Shulman, 2015) and they can affect their social life and identity, as well as the validity of their actions or beliefs (Murray, 2005; Zola, 1993). In order to change the perception that exists towards people with limb loss and eliminate stigma, it is important to transform the negative evaluation into positive. This may be achieved through the combination of medical and fashion design.

1.1 Changing society by designing fashionable prostheses

Simon (2014) and Kongprasert (2012) highlight the power of fashion to connect with culture, politics and personal identity. Throughout the years various fashion trends have been used by people in different subcultures in order to express beliefs and values or question the cultural and social norms. Pullin (2009) and Vainshtein (2011) highlight the contribution of fashion to people with disabilities, by mentioning as an example the evolution of glasses, and maintain that fashion can help them fight against the societal norms of oppression and marginalisation by using products which highlight their impairment, in order to make clear the statement that they are not a stigmatised group. As Pullin (2009) says, "a more confident and accomplished design could support more positive images of disability" (p.15).

The development of Additive Manufacturing (AM), during the last decade, and its incorporation in the design process of prostheses has led to new directions. Designers such as Scott Summit (2011), The ALLELES Design Studio Ltd (2017) and Aviya Serfaty (Kim, 2010) declare that by transforming prosthetic parts into accessories users can highlight their identity. Aimee Mullins (2009) maintains that prostheses can be used not only as products which replace mobility, but also as symbols with which users can build their own identities and stop being considered as disabled. In their review about the design of prostheses, Hall and Orzada also point out the significance of fashion in the creation of social meanings which are contrary to those based on the normalcy of the human body by saying that:

> *If one concedes that limb loss is a violation of the normative body, then bringing attention to it would be making a social statement, one that rejects societal pressure to conform to the normative embodied ideal. From this perspective, style, in the form of expressive prostheses, could be used by persons with limb loss to make this positive social statement. Prostheses that solicit attention would emphasize individual uniqueness and highlight yet another aspect of diversity within the contemporary society. (Hall & Orzada, 2013, pp. 26-27).*

Prosthetic limbs that can increase users' confidence can eliminate self-stigma. If people with limb loss feel confident about themselves and their body image, they can affect the attitudes that people around them (e.g. family, friends) have regarding their condition and as a result reduce the stigma by association which may lead to a restriction of public stigma. Nevertheless, although there are a variety of available prostheses, a recent study conducted by Cairns, Murray, Corney and McFadyen (2014) proves that the majority of people with amputation are not satisfied with the prosthetic limbs

they use. This may be a result of the lack of research that exists concerning the research area of users' preferences towards prosthetic limbs and the factors that can affect these preferences.

2 Research Methods

2.1 Terminology of research

The terms prosthesis or prosthetics are used in order to describe the artificial devices which replace lost parts of the body (e.g. teeth, fingers, arms, legs etc.) and they are used for functional and/or aesthetic purposes (Prosthetic devices, n.d.; Sansoni, Wodehouse, McFadyen & Buis, 2015). In this study, these terms describe only the artificial devices that are used by people with upper and/or lower limb loss, such as arms and/or legs.

In literature, different terms are used in order to describe the types of prostheses that exist. The prosthetic limbs that imitate the human limbs visually (Figure 1a) are usually referred as cosmesis or cosmetic devices (Hall & Orzada, 2013; Pullin, 2009; Sansoni, Wodehouse & Buis 2014). In this paper, these prostheses will be mentioned as Realistic Prostheses (RP). The prosthetic limbs that focus on functional aspects and have a robotic design (Figure 1b) will be referred as Functional Prostheses (FP). Finally, for the prosthetic limbs that focus on aesthetic aspects with an aim to highlight the personality and the identity of the wearer (Figure 1c), will be described using a term that Hall and Orzada (2013) introduced; Expressive Prostheses (EP).

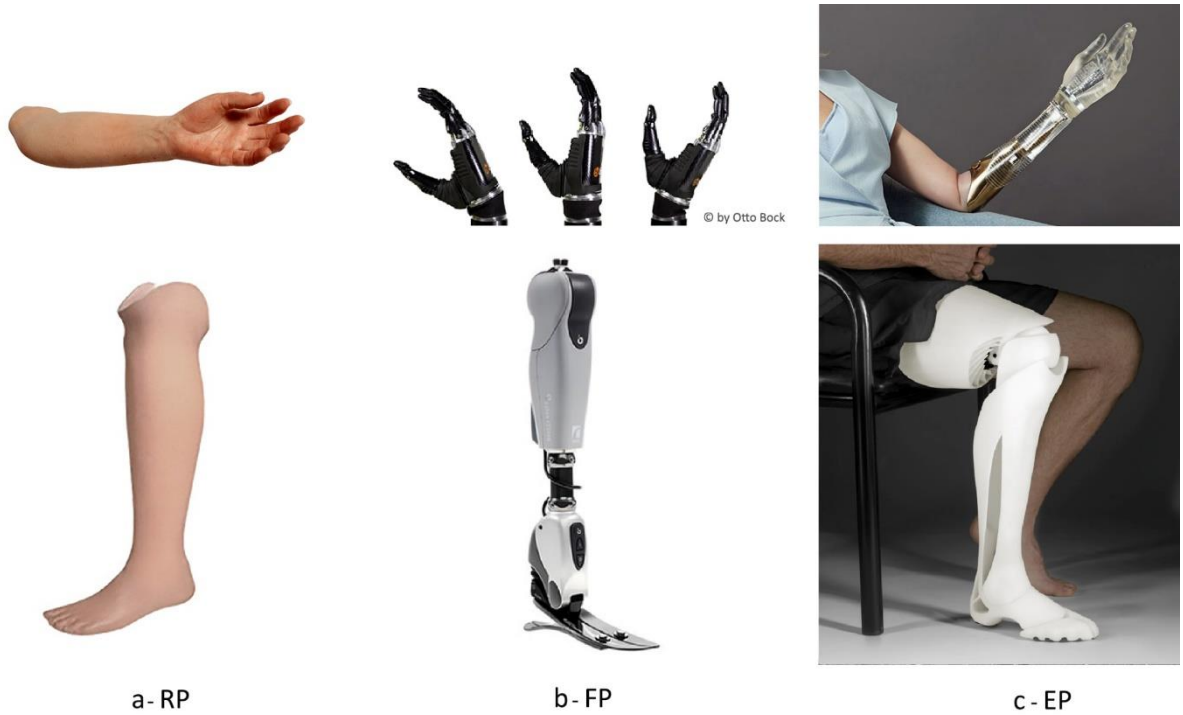

Figure 1 a. Above: Realistic prosthetic limb for upper limb loss made of silicon. Designed in 2013 by Sophie de Oliveira Barata. source: The alternative limb project (2018). Below: The Dream Skin prosthetic limb for lower limb loss by Fillauer Company. source: Fillauer (2018); b. Above: bebionic Hand designed by RSL Steeper. source: Otto Bock HealthCare GmbH (2017). Below: The RHEO Knee. source: Össur (2018); c. Above: The Synchronised prosthetic arm designed in 2017 by Sophie de Oliveira Barata and Dani Clode. Photographed by Omkaar Kotedia and used by Kelly Knox. source: adjusted by The alternative limb project (i) (2018). Below: Custom made 3D printed prosthetic limb from Bespoke Innovations designed in 2008 by Scott Summit. source: adjusted by SummitID (2017).

The categorisation of the artificial limbs into realistic, functional and expressive was used in the survey, which is analysed in the next sections of the paper, and were used to the better understand of the types of prostheses that participants use and prefer.

2.2 Aim and Objectives

The aim of the study was to investigate users' preferences towards the three types of prostheses (RP, FP, EP) in order to understand whether people's preferences are affected by the culture in which they live.

The objectives were:

1. To critically analyse prior knowledge about issues surrounding cultural impacts of prostheses.
2. To gather insights with respect to the two cultures being studied as well as the demographic and disability related variables.
3. To explore the reasons that the disability variables and culture have led participants to their choices.
4. To establish key criteria which drive users preference based on the cultural context of the two countries and compare them with previous investigations in order to evaluate which variables influence their choices.

2.3 Questionnaire and Variables

The study was based on quantitative methods. One of the instruments that is used in quantitative methods, in order to gather large numbers of data in a particular time period and determine relationships between the variables, are surveys which can be conducted using questionnaires (Cohen, Manion & Morrison, 2011).

The questionnaire consisted of sixteen closed questions and one open question in which users who own prostheses that belong to more than one of the three types (RP, FP, EP) described their prostheses. Thirteen questions were multiple choice, two were dichotomous and one was a grid. Six of the questions were based on demographic data (age, sex, nationality, residence, educational level and annual income) and were four about disability related characteristics (area/ level and cause of limb loss, time since operation and years of wearing prosthetic limb(s)). Two of the questions were pictures that depict prosthetic limbs which were separated into the three types of prostheses (RP, FP, EP). In these questions participants had to choose the category in which the prosthetic limb they already have fits. If they were not satisfied with the limb they already have, they needed to choose the prosthesis they would most like to have and give reasons of their choice. In the last question, participants had to state what they think about their appearance with respect to the prosthetic limb they already use. All the variables tested were derived from previous investigations which show what may constitute factors that can affect people with limb loss.

2.4 Participants

Amputees and people with congenital limb loss constitute a sample that it is difficult to approach. Many people with limb loss are isolated from others as they have not accepted the limb loss and deny speaking about it. Nevertheless, there are few ways through which researchers can contact them. One way is through support or sport groups, charities and organisations. The second way is through clinics (private or NHS) and the third way is individually or through groups on the social media. However, conducting research with patients of the National Health Service (NHS) of the UK requires additional ethics approval; that from the Research Ethics Committee (REC). As Robson and McCartan (2016) point out, getting an approval from NHS is a very difficult and time consuming process and there are many factors that affect the process. As a result of the fact that NHS patients could not be reached, as the author did not have a REC approval, volunteer and snowball methods were adopted for the conduct of the study. Table 2 depicts the number of people the author conducted. However, these methods usually are not representative of the population. Another reason that contributes to the sample not being representative was the exclusion criteria which were:

- Being under 18 years old.
- Do not own prosthetic limb(s).
- Have not been born and grow up in Greece or in the UK.

Table 2 The number of people the author contacted in order to ask them to participate in the research and/or inform other people. Snowball (i) and volunteer (ii) methods.

Contacts	UK	Greece	Total
Private Companies (ii)	5	11	16
Support groups and Charities (i, ii)	35	13	48
Private Clinics (ii)	5	2	7
Organisations (i, ii)	3	3	6
Sport groups (i, ii)	11	26	37
Individuals (i)	7	8	15
Social Media (Facebook and Blogs) (ii)	6	1	7
Responses			
Not answered	17	13	30
Negative	26	23	49
Willing to help	27	30	57
Helped	22/27	20/30	42/57

2.5 Completion of questionnaire

Most of the participants completed the questionnaire online. However, in eight cases the questionnaires were given to participants as hard copy as participants were older in age with limited or no access to the Internet. In the introduction of the questionnaire, two links were provided to the Participant Information and the Informed Consent Form. Participants who accepted the conditions described in the Informed Consent Form continued to the questionnaire. Participants who did not answer more than two questions were excluded from the analysis.

2.6 Ethics

The study was approved by the Ethics Sub-Committee for Human Participants of Loughborough University. Full ethical approval required the submission of the Participant Information, the Informed Consent Form, the Risk Assessment Form, the Ethical Clearance Checklist and the Research Proposal for Studies Involving Human Participants.

3 Results

As the sampling methods of the survey were non-probability, only descriptive statistics were used with visual means in order to describe the findings of the survey. Microsoft Excel 2010 was used for the coding of the findings, as well as their analysis and the production of the visuals.

The questionnaires were completed by 157 people (78 participants from the UK and 76 participants from Greece). Twenty-one responses were excluded from the analysis due to the exclusion criteria described in the Participants section of the paper. The total number of valid answers was 136 (87%) with 67 participants from the UK and 69 from Greece. In both countries, the majority of participants were male. In the UK most of the people who completed the questionnaire were above 45 years old while in Greece, most of the participants were below 45 years old (see Table 3).

Concerning the prosthetic limbs participants own, in the UK the majority of participants answered that they own RP (49%) while in Greece most of the participants have FP (54%). In both countries, EP has the lowest percentages (9% in the UK and 1% in Greece). However, half of the total number of participants said that they would like to use a different prosthetic limb as they are not satisfied with the one they own. Similarities between the two countries are presented regarding the ranking order

of the prosthetic limbs participants prefer. Based on the findings, FP is first in the participants' preferences; EP comes second and last is the RP.

Table 3 The percentages of participants from Greece (GR) and the UK regarding their age and sex. The parentheses present the actual number of participants.

	GR						UK					
Age	Males		Females		GR Total		Males		Females		UK Total	
18 to 29	20%	(14)	4%	(3)	25%	(17)	0%	(0)	7%	(5)	7%	(5)
30 to 44	20%	(14)	6%	(4)	26%	(18)	4%	(3)	12%	(8)	16%	(11)
45 to 59	28%	(19)	6%	(4)	33%	(23)	25%	(17)	19%	(13)	45%	(30)
60+	9%	(6)	7%	(5)	16%	(11)	24%	(16)	7%	(5)	31%	(21)
Grand Total	77%	(53)	23%	(16)	100%	(69)	54%	(36)	46%	(31)	100%	(67)

The analysis of the reasons that participants chose the prosthetic limbs they prefer with respect to their nationality (see Figure 2) presents differences between the two countries. Although functional reasons ('Both Functionality and Aesthetics', 'Great Mobility', 'High Functionality') are the priority for people in both countries, Greek participants have also chosen social reasons, such as 'Not Attract Attention' and 'Normal Body Appearance', while participants from the UK emphasise identity reasons, such as 'Highlight Personality', 'Suits my Style'. 'Participation in Everyday Activities' has been ranked high to both countries.

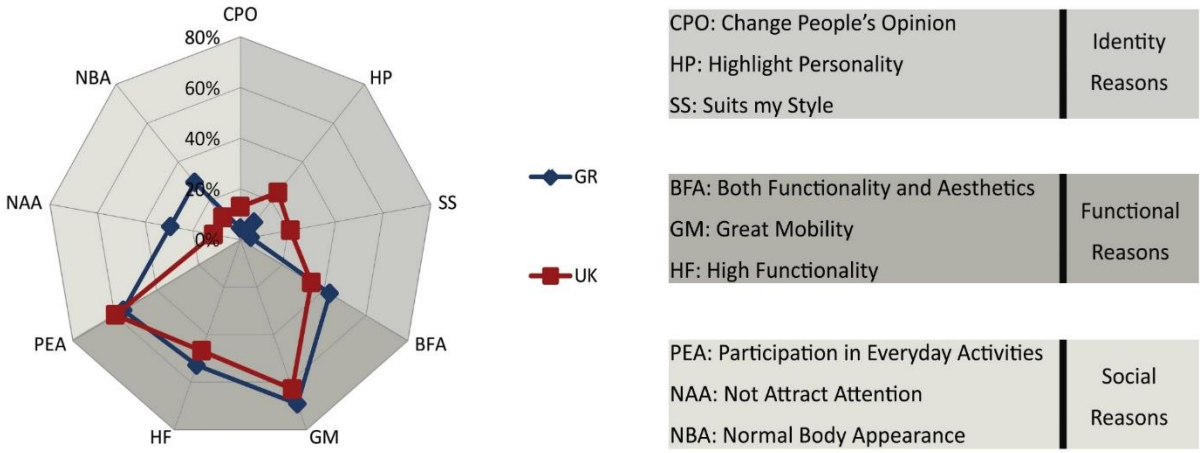

Figure 2 The reasons for which Greek (GR) people and people from the UK chose the prosthetic limb they prefer.

3.1 Demographic characteristics

The findings of the study regarding sex show that FP has been chosen as the most preferable prostheses among both sexes in both countries. In Greece, the order of RP and EP is not clear, since they present similar proportions. However, in the UK, male preferences towards RP and EP are the reverse of that of females, as EP is the least preferable prostheses for males and RP for females (see Table 4). Regarding the prosthetic limbs participants want and age FP has the highest percentages among all age groups except the one with the UK participants who are over sixty years old and prefer RP. Additionally, it can be noticed that in both countries, EP comes second for participants who are 18 to 59 years old, while for participants over 60 years old, EP is the least preferred type of prostheses (see Table 4).

Table 4 Participants' preferences towards the three types of prostheses regarding country and demographic variables. The parentheses present the actual number of participants (N.P.) of each country to each subgroup.

	GR				UK			
Demographic variables	RP	FP	EP	N.P.	RP	FP	EP	N.P.
Sex								
Males	10%	79%	11%	(53)	26%	60%	14%	(35)
Females	19%	62%	19%	(16)	16%	48%	36%	(31)
Age								
18 to 29	12%	70%	18%	(17)	20%	40%	40%	(5)
30 to 44	0%	83%	17%	(18)	9%	64%	27%	(11)
45 to 59	13%	74%	13%	(23)	7%	62%	31%	(29)
60+	27%	73%	0%	(11)	48%	43%	9%	(21)
Educational level								
Secondary School	10%	77%	13%	(31)	35%	60%	5%	(20)
Further Education	0%	85%	15%	(13)	11%	54%	35%	(26)
High Education	20%	68%	12%	(25)	20%	50%	30%	(20)
Annual income								
No income	14%	72%	14%	(7)	0%	100%	0%	(4)
Very Low	0%	88%	12%	(17)	22%	53%	25%	(36)
Low	13%	71%	16%	(31)	25%	50%	25%	(16)
High	20%	70%	10%	(10)	17%	50%	33%	(6)
Very High	25%	75%	0%	(4)	25%	50%	25%	(4)
Area of residence								
City	9%	76%	15%	(55)	30%	35%	35%	(26)
Town	33%	67%	0%	(6)	17%	69%	14%	(29)
Village	17%	83%	0%	(6)	11%	78%	11%	(9)
Hamlet/Countryside	0%	50%	50%	(2)	0%	0%	100%	(2)

The findings concerning educational level show that in both countries, FP has the highest percentage of all categories. RP is not a significant percentage among participants with further education, while the percentages of RP and EP are reversed between the two countries; Greek participants with high levels of education have the lowest preference towards EP and UK participants towards RP. FP is the most preferable to all categories of annual income. However, Greek participants with a high level of annual income prefer more RP than EP, while the participants from the UK who belong to the same category do prefer EP. Greek participants with very low level of annual income seem to like more the EP, which is contrary to the participants with a very high level of annual income who have chosen RP. In case of the participants from the UK, the results towards the preferences of RP and EP are not so clear. Only in case of participants who have high income, where EP appears to be more preferable than RP. The results regarding the area of residence, in case of the UK, are not clear; on the other

hand, Greek participants' preferences seem to be affected by the area of their residence. Although the results are not representative, none of the Greek participants who have chosen 'Town' or 'Village' as the area of their residence chose EP.

The analysis of the reasons that female and male participants chose the prosthetic limbs they would like to use shows that the reasons NNA, NBA and HP are higher in female participants of both countries than in male participants, whilst CPO is also higher in the females from the UK. Concerning education and annual income, the longest difference in hierarchy between the two countries is observed in the categories 'High Education' and 'High' income. Analysis of the reasons and literature do not give further explanations. As the preferences of Greek participants seem to be affected by the area they live, a further analysis on the reasons due to which Greek participants who live in cities (C), towns (T), villages (V) and countryside (C/S) chose the prosthetic limb they prefer was conducted. The analysis of the answers shows that NAA and NBA are higher in case of Greek people who live in villages and towns and lower in cases of city and countryside (see Figure 3).

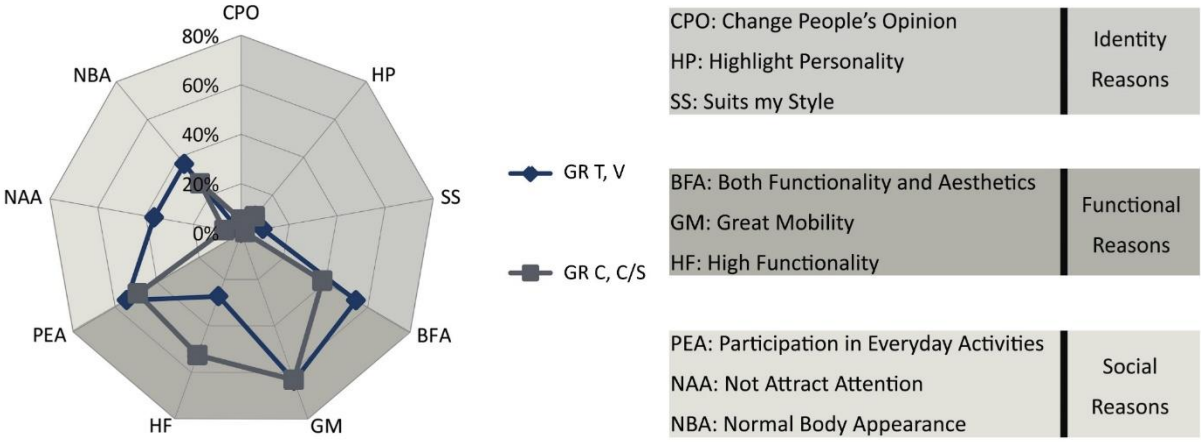

Figure 3 The reasons for which Greek (GR) chose the prosthetic limb they prefer regarding the area of their residence.

3.2 Disability related characteristics

One of the disability related variables is the time that has passed since the amputation, which is similar to the number of the years that the participants have worn prosthetic limbs; with 98% of them answering that they have owned prostheses for the same time period as that that has passed since amputation. Participants who wear prostheses for a short time period (0 to 4 years) show a preference to FP, especially in Greece (see Table 5). For Greek participants who wear prostheses for 5 to 14 years, EP is a more desirable option than RP, whilst on UK participants more preferred are RP and EP. Finally, for those who wear prostheses for more than 15 years, FP has the highest proportion of responses in both countries whilst the percentages of RP and EP are close. Concerning the cause of limb loss, the two countries demonstrate the same hierarchy of the three types of prostheses. More specifically, FP have been ranked as the most preferable prostheses for all categories; in participants who have the amputation due to trauma/accident reasons, RP is the least preferred, while in participants with congenital limb loss, the least preferred type is EP. Finally, the area of limb loss, as well as the level of limb loss do not appear to influence users' preferences.

Table 5 Participants' preferences towards the three types of prostheses regarding country and disability related variables. The parentheses present the actual number of participants (N.P.) of each country to each subgroup.

	GR				UK			
Disability related variables	RP	FP	EP	N.P.	RP	FP	EP	N.P
Years since amputation								
0 to 4	0%	100%	0%	(13)	7%	75%	18%	(28)
5 to 14	0%	84%	16%	(19)	35%	30%	35%	(17)
15+	16%	68%	16%	(25)	31%	46%	23%	(13)
Years wear prostheses								
0 to 4	0%	100%	0%	(14)	7%	73%	20%	(30)
5 to 14	5%	76%	19%	(21)	42%	26%	32%	(19)
15+	18%	67%	15%	(34)	24%	52%	24%	(17)
Cause								
Disease	17%	66%	17%	(12)	32%	44%	24%	(34)
Trauma/Accident	6%	81%	13%	(48)	4%	69%	27%	(26)
Congenital	33%	56%	11%	(9)	33%	50%	17%	(6)
Area of limb loss								
Upper	23%	54%	23%	(12)	0%	89%	11%	(10)
Lower	9%	80%	11%	(56)	25%	49%	26%	(57)
Level of limb loss								
Single	12%	76%	12%	(59)	19%	58%	23%	(55)
Double	14%	71%	14%	(7)	36%	36%	28%	(12)

The analysis of the reasons that participants who had their amputation 0 to 4 years ago chose the prostheses they prefer shows that functional reasons are the most popular in both countries (see Figure 4). However, participants from the UK are also worried about the consequences of limb loss on their appearance and identity (CPO, HP, SS), reasons which still remain high for participants who had their amputation five years ago or more. Contrary to the UK, Greek participants appeared to worry more after the amputation for social reasons and the consequences that the limb loss will have on their social life (NBA, NAA), probably due to stigma. The analysis of the reasons participants chose the prosthetic limb they would like to use with respect to the cause of the limb loss show that functional reasons are the most important among all categories. However, in the case of participants who had limb loss due to trauma, Greek participants present a high proportion of social reasons (NAA, NBA), whilst the UK participants focus on identity (HP, SS, CPO). In the case that the amputation was caused by disease, social reasons and especially those of NBA and CPO, are high in both countries. In case of congenital limb loss, participants from both countries have chosen social (NBA, NAA) and identity (HP) reasons, while none of the participants chose CPO and SS as reasons of their choice.

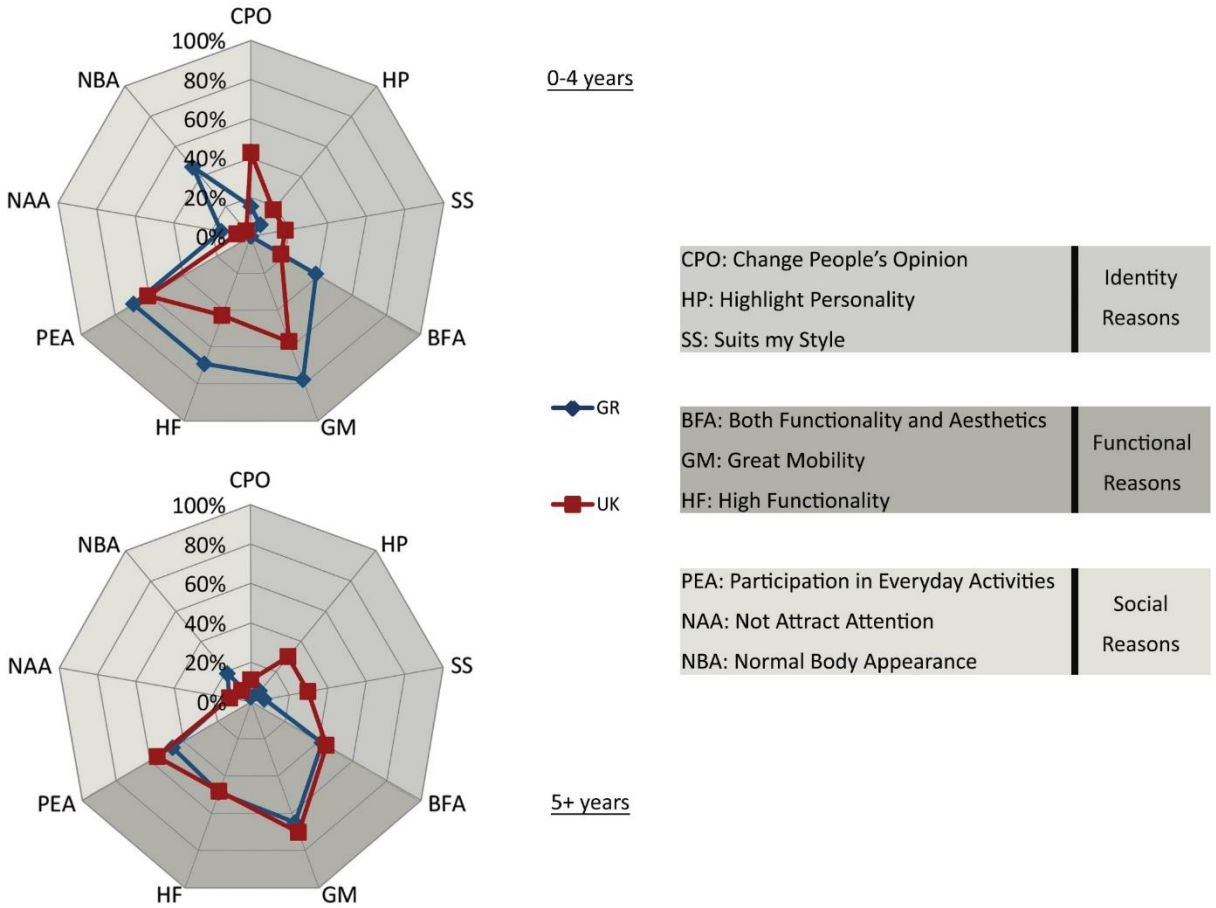

Figure 4 The reasons due to which the participants from Greece (GR) and the UK who had their amputation 0 to 4 years ago (up) and five years ago or more (down) chose the prosthetic limb they prefer.

4 Discussion

Although the findings are not representative of the population, it is clear that RP and FP are the most broadly used prosthetic limbs in both countries, while EP is not so popular among prosthetic users, especially in Greece. This is not surprising, as EP constitutes a new type of prosthesis that has been developed during the last decade. Nevertheless, the findings show that a very large number of people are not satisfied with the prosthetic limb(s) they own. This is in accordance with the findings of the study that Cairns et al. (2014) conducted. The analysis of participants' opinion regarding their appearance and the prosthetic limb they own presents similarities in both countries, as it shows that RP creates the most negative feelings to users since it presents the lowest percentage of positive effect. Figure 5 shows the prostheses owned (columns) versus the preferable prostheses (sections of columns) of participants who believe that their prosthetic limbs affect their appearance negatively. As it can be noticed, participants who own RP would like to use FP, while most of the participants who own FP and they are not satisfied would like to use EP. Additionally, none of the participants who already own EP answered that EP negatively affect their appearance. However, as the sample of people who own EP is very small further investigation is necessary.

Nguyen (2013) supports the existence of a distinction between the two sexes regarding the reasons they use the prostheses and points out that women are more concerned than men about identity and body image reasons, as they worry about their image and attractiveness. This is in accordance with the findings of the study and the analysis of the reasons due to which participants chose the prosthetic limb they prefer. Age seems to be a variable independent of culture; however, the results show that age affects the preferences of people to a great extent as in both countries EP are more preferable to younger participants and least preferable to those who are over 60 years old.

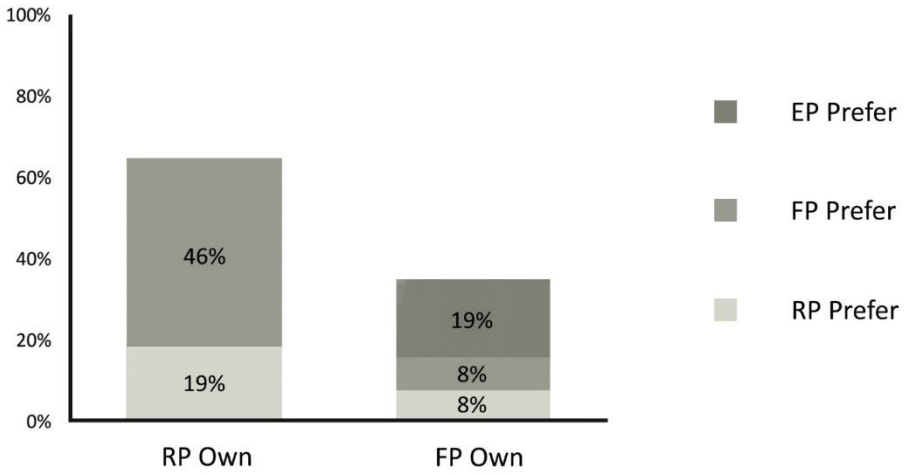

Figure 5 The total number of participants who answered that the prostheses they own (columns) affects their appearance negatively. The segments of each column show the prostheses participants prefer.

Interest presents the fact that although Greek participants are concerned about social reasons and try not to attract the attention of people to the limb loss, many Greek people chose EP, which purpose is to highlight wearer's uniqueness and identity; a purpose contrary to the values of Greek culture as a collectivism society with high uncertainty avoidance and power distance. However, the analysis shows that only the Greek participants who live in cities chose EP. Thus, the area of residence seems to affect the preferences of people of HC societies, probably due to the collectivism orientation they have, as well as stigma, which can easily be spread to collectivism societies, such as Greek villages. Thus, in order not to be stigmatised by the society in which they live, people try to use prostheses that will not attract people's attention to the limb loss. Furthermore, the higher rate of EP in preferences of Greek people who live in cities verifies the investigations which support that the urban societies of Greece are in a transitional phase from collectivism to individualism societies (Georgas, 1989; Pouliasi & Verkuyten, 2011).

Nguyen (2013) points out that amputees are not concerned about the appearance of their prosthetic limb(s) when they are at the stage of recovery (after amputation) and only when they accept their limb loss do they start thinking about how the prosthetic limb affects their image. This is supported by the findings of the study which shows that the percentage of RP and EP is higher for participants who had the amputation more than five years ago. Furthermore, the reasons due to which participant chose the prosthetic limb they prefer with respect to the years that have been passed since the amputation constitutes a factor that is affected by the culture as Greek participants worry about the impact that amputation will have in their social life and environment, whilst participants from the UK are more concerned about the impact of amputation in their personality and identity. Based on the theories regarding HC and LC societies and the analysis of the reasons it can be assumed that when amputees from collectivism societies realise that people around them, as well as society accept the limb loss, their social anxiety will be decreased. On the other hand, the anxiety of people from LC societies will be easier decreased when they accept their new body image or maintain their previous identity.

As it can be noticed from the analysis of the participants' preferences towards the three types of prostheses with respect to the cause of the limb loss, RP is the least preferable type only in case of trauma. Furthermore, the analysis of the reasons shows that in case of limb loss due to disease, participants from both countries are concerned about social reasons. This may be due to the fact that when the amputation is a result of disease, people worry about the opinion that others have towards them and want to prove that they remain capable people and not a vulnerable group in order to reduce the stigmatisation of illness. When the limb loss does not happen suddenly in their life, as a congenital limb loss, people develop their identity based on that and as a result, they do not

have the need to change people's opinion. The findings concerning the cause of amputation are also supported by the literature regarding the cause in the industrialised and non-industrialised countries (Esquenazi, 2004; Hagberg & Brånemark, 2001). More specifically, in the UK (industrialised) the majority of the participants said that their limb loss occurred because of disease, while in Greece (non-industrialised) the main cause of amputation is trauma/ accident reasons. Congenital limb loss is the last reason in both countries, which is also in accordance with Esquenazi (2004) who says that the percentage of people with congenital limb loss is low in comparison with those of other reasons.

Although the contribution of the study to the design knowledge of prosthetic limbs needs more investigation, it is the author's opinion that the first step that needs to be taken in order to change society's opinion towards people with limb loss is to inform the people in the area of the design of prostheses of the preferences that users in different cultures have towards prostheses. This should lead to social innovation and the possibility of eliminating stigmatisation by increasing patient's confidence.

4.1 Limitations of the study

One of the limitations of the study is the sample of the research. The author acknowledges the fact that the sample is not representative of the population and this may have led to biased conclusions. However, as the aim of the study is to understand generally the preferences that people with limb loss have towards the various types of prostheses the sampling methods were deemed to be suitable for the purpose of the survey. Another limitation is the fact that although Greece and the UK present different cultural contexts, both of them are in Europe and as a result, their cultures may have been affected due to the homogeneity that globalisation causes.

5 Conclusions

The survey has been conducted in the UK and Greece and its aim is to investigate the preferences of people with limb loss towards the three types of prostheses (RP, FP, EP) and whether their preferences are affected by the culture in which they live, as a first step that can be done in order to bring societies closer to social innovation. The aim of the survey has been met and as the findings show, culture does not seem to affect the hierarchy of the preferences with FP being the most preferable prostheses and RP the least. The insights regarding the demographic and disability related variables with respect to the culture of the two countries (objective 2) have been gathered, and the reasons due to which participants have chosen the prosthetic limb they prefer based on the variables and culture (objective 3) have been explored. More specifically, in Greece the majority of participants are concerned about social reasons and the influence the limb loss will have in their social life, probably due to stigma whilst in the UK, participants' concerns focus on the consequences that amputation will have in their personality and identity. However, as the findings of the study are not clear, the key criteria that drive users' preferences with respect to the culture cannot be established (objective 4). Although age and cause of amputation seem two variables independent of culture, further investigations are necessary to be conducted in order to particularly test the influence of sex, age, area of residence, cause of amputation and the years wear prostheses, on people's preferences.

Furthermore, the fact that EP is second in people's preferences in both countries appear to be contrary to the theories of HC/ LC societies and the theory of collectivism/ individualism (objective 1), and supports the investigations which show that societies such as Greece are in a transitional era and many people with limb loss feel confident about themselves and they are ready to defend the fact that they do not consider themselves to be disabled, but as active people who can contribute to society. However, the vertical comparison of participants' preferences regarding EP indicates that the percentages of EP are higher in the UK (LC) than in Greece (HC) in almost every subgroup, demonstrating that culture still plays a role in people's preferences albeit to a different degree in the different cultures.

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Culture-Orientated Food Design for Social Issue

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Cultural globalization threatens cultural diversity, especially for minority cultures and ethnic cultures. In response to the fading of cultural identities, there is rare literature discussing how design can contribute. Through integrating the cultural significance of food and food design methods, the paper proposes a culture-oriented food design model to strengthen cultural identity and create connections. A case study of designing a delivery service of Chinese food for the second-generation Chinese Americans is presented to solve their identity crisis through the process of defining user, content, experience, and design around culture respectively. Feedback from target users shows that the cultural meaning contained in the service can evoke their ethnic identity successfully. The result indicates that the design on culturally significant food can be applied to the identity problem related to specific communities and populations by enhancing food experiences, thus to strengthen cultural identity, increase social inclusion and cultural diversity.

food culture; cultural significance; user experience; identity crisis

1 Introduction

Nowadays, cultures keep interacting all the time. It's easy for people to approach various music, book, food from different cultures in one place. Therefore, concerns about cultural homogeneity have emerged. Influence of strong culture has caused crises in the marginalized society's cultural ecology. Concerning food, on the international level, industrialized food like McDonald became a major target of the anti-globalization movement (Kellner, 2003); for a country, such as in China, there is the influence of Han culture on the local food system of ethnic minorities; for a city, ethnic and marginalized diets are also somewhat affected by the host society. However, the one-way assimilation is not practical in this globalized world. Manzini (2015) proposed that a resilient society means it must have cultural diversity and creativity. Homogenization, which was often assumed as the only consequence of globalization as a process, instead of it, the loss of heritage culture does not inevitably occur.

Therefore, the critical point of the paper intends to explore is how to help minority and marginalized groups enhance their cultural identity under the influence of mainstream culture. Informed by

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"cultural significance of food and eating" (Murcott, 1982) and "design as one of the key factors influencing the identity of the culture" (Morelli, 2011), this paper presents a culture-oriented food design model, for the purpose of designing a food and eating experience aiming at creating cultural meaning. Following the design model, this paper presents a case study of designing culture-orientated food design for second-generation Chinese immigrants in New York. Their experience of identity crisis is in relation to the dominant American identity and ethnic background. Based on this context, the paper details the process of designing food experience on Chinese food to strengthen their ethnic identity. The results showed that the new experience is an effective way to engage them joining cultural practices and interacting with their cultural identity.

2 Design Objectives and Methods

2.1 Cultural Significance of Food

People's identity is best understood as performative, and food becomes a critical piece of it in every day (Stajcic, 2013). Different from language, food is not being exact, it's broad and deep (Anderson, 2014). As a kind of material culture, food has features of social culture and spiritual culture at the same time, and this is the fundamental concept of food culture in Anthropology. From this point, researching food culture also reflects the meaning of the whole culture.

2.1.1 Construction of Social Identity

In conditioned situations, food can be a symbol of identity of ethnic groups. The same food, bread, for example, is consumed both in the west and east, but it can generate unique identity in a particular context. Food is particularly important when you are separated from mother culture; for immigration, food is the last vestige of culture that people shed (Choi, 2014). Among all the manifestations, one of the best ways of getting into a culture's heart would be through its stomach (Chang, 1977). Food conveys subtle and complex messages (Anderson, 2014). It not only provides the energy we need for survival but also connects with our emotion - mood, feeling, and tone (Anderson, 2014). More importantly, food is a social code and eating is a social activity for everyone to build and express the relationship with his ethnicity and the world (Figure 1).

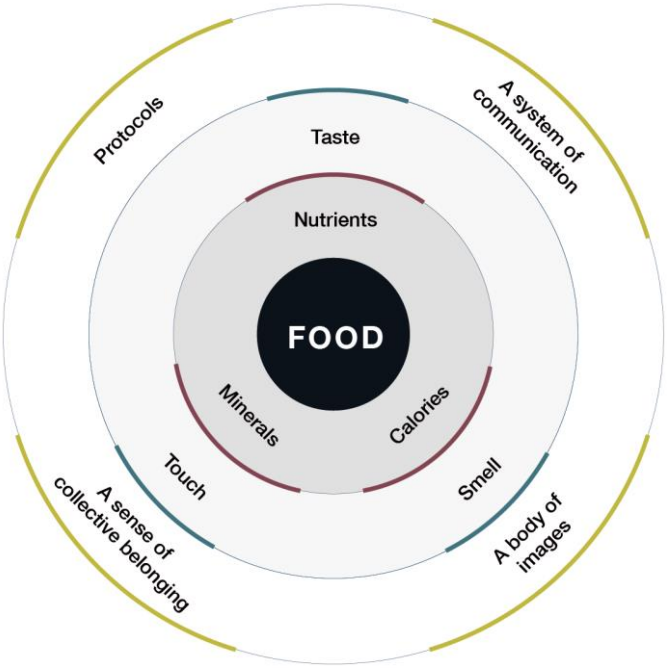

Figure 1 Onion diagram of food's function and meaning

2.1.2 Convey of Social Meanings

Anthropologists of food consider food as an essential aspect to understand social life and relationship. They not only research the production, distribution, and consumption of food, but also prefer to see food as a specific field or a carrier of communication, significance, and narration.

As a useful communication method, Stajcic (2013) said knowing a culture through food is an interesting way since people will keep asking questions abo7t the details, like the name, ingredients, origin, and history. For example, in each culture's cuisine, the ingredients people chose to use are dependent on a lot of factors, like the land, the climate, and religious or social sanction. It's easy to tell which cuisine when people see the staple ingredients combination. Every cuisine contains a long story about ancestors and history. Choi (2014), founder of the Mash-up Americans said, our comfort foods map who we are, where we come from, and what happened to us along the way.

2.2 Food Design

Food design influences our food choice within our unconscious. According to Victor Margolin (2013), there is a close connection between food and design, regrettably, scholars are yet to recognize the close relationship between the two. Food design is the design of food; it sees food as an object for designing, includes its taste, consistency, texture, surface, the sound of chewing, smell, and all other object properties. On the system level, Dr. Francesca Zampollo (2016) proposes the innovation of food design contains all the procedures of production, procurement, preservation, and transportation, to preparation, presentation, consumption, and disposal. There are many fields in food design, such as food shaping, packaging, food space, eating situation, food service, etc.

Recently, the design on food has expanded from the design of products to the broader category of diet services, business models, and system design (Kuang & Chou, 2017; Fassio, 2017; Ballantyne-Brodie & Telalbasic, 2017). And the topics discussed are more inclined to design reflections on health, safety and environmental issues brought by industrialized food production (Bozzola, Palù & De Giorgi, 2017; Ballantyne-Brodie & Telalbasic, 2017; Cecchini, 2017), such as urban farms and slow food movement.

2.3 Integration of Food design and Cultural Significance of Food

Although new areas such as critical food design and sustainable food design have emerged in food design, it is still relatively rare to explore food design from its cultural meaning and produce a reflection. One example is the "Chopsticks" project co-operated by four design institutes in Hong Kong, South Korea, China, and Japan. This project is to explore diversity through a comparative study of cultures and lifestyles in Asia and think about what we should do in the future, how to respect our cultural heritage, and ensure that we will still enjoy the benefits of identity in the future (Lam, Lee, Liu, Yamanaka & Woo, 2006). Because food can become a physical and spiritual carrier of a social group, moreover, food culture constitutes ethnic and cultural identity, therefore, combining the design method with regional and ethnic characteristic food culture can enrich the theme and content of food design. The other way around, design also has a positive effect on the culture of a particular food.

3 UCED Model for Culture-orientated Food Design

Considering discipline of design and cultural study, the author proposed a UCED model (Figure 2) for working on cultured-orientated food design. Specific User with High demands for the culture, specific Content among the culture's components with High connectivity, and good Experience with High engagement for user are three basic criterions. Besides, High autonomy of the Design solution could guarantee that it is independent enough to sustain for a long time.

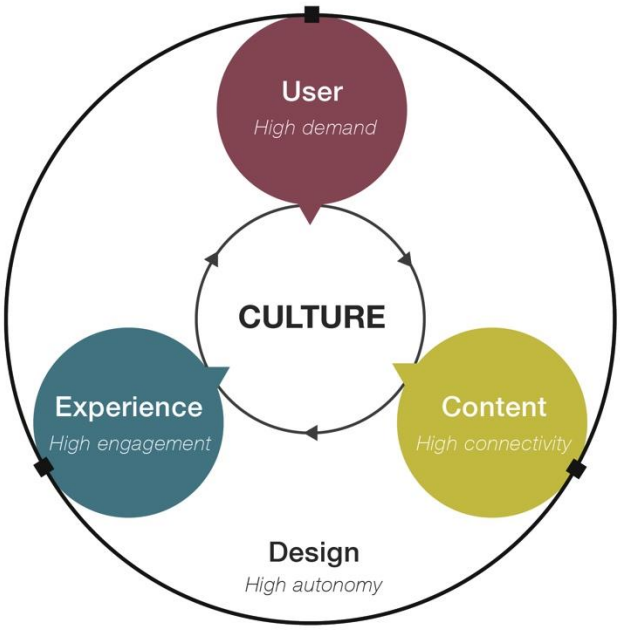

Figure 2 User-Content-Experience-Design (UCED) model

User: The Cultural issue is a complex, continuously changed topic. The more frequently that people from different culture meet every day, the more complicate the social network is. For example, the culture-related issue around immigration involves various stakeholders, such as generations of immigrants, other ethnic groups or people in host society culture. They influence each other from behavior to value in the interpersonal communication process. Thus, the user whom the design focuses on needs to be figured out early and deeply understood. In design discipline, the user-centered design has been widely accepted, and regularly, even the user had been fixed when the designer took the case. However, in an ill-structured cultural problem, the decision-making on the user is always the crucial and first step, which needs a large amount of desk research and interviews on related groups of people. Thus, people with the highest demands for a defined cultural problem should be clarified.

Content: As a culture-orientated design, the cultural meaning that food can express depends on how the designer understands food culture in depth. Culture is visible but not always decipherable. Culture contains a lot, and Tylor (1871) defined culture as "a complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society." Considering food, which part of food culture that designer wants to adopt, emphasize and convey needs to be researched and carefully chosen. There are several paths for designer to learn: designer can live with culture holder to acquire the eating custom and habits; designers can work with chef, baker, food scientist to learn about raw materials and cooking techniques; designer can learn from anthropologist about culture's meaning and function of diet, food and eating in society. Different paths can let designers comprehend food and its culture from different angles. Specific content should be selected in accordance with its complexity and feasibility, considering design context and user's motivation.

Experience: In current cases of design for culture, designers create products with the cultural connotation for spreading a nation or ethnic's cultural identity and value. Souvenir shop in the museum is a primary field for that. Consumers get in touch with the culture through momentary consuming behavior. This is a product-oriented way to transmit culture. However, culture learning and understanding is best seen as a lived experience (Moran & Lu, 2001). "Understanding in practice" is viewed as a compelling way of enculturation, that knowing is generated in situations whose specific characteristics are part of the practice (Kirshner & Whitson, 1997). In details, the manifestation of culture has different levels of depth, which are symbols, heroes, rituals, and values

from superficial level to the deepest one. Value, which is the true meaning of culture yet intangible, can be revealed by practices of first three tangible aspects. Therefore, the meaning of culture is best gotten by experiencing specific activities involving physical objects. Based on the properties and educational research on culture, the experience is one element that design should be included to engage users.

4 Case Study: a Culturally Significant Food Service for Chinese-American

4.1 Context

As one of the countries that have the largest immigration population, a lot of races and cultures coexist in America. Among all the cities, New York is the most diverse one. The demographic information of New York City in 2010 shows the ratio of white population is 44%, African is 25.5%, Hispanics are 28.6%, and Asian is 12.7%. Leaving their country of origin, immigrants need to deal with the separation from a familiar environment and try to assimilate to the dominant culture in a new society. In this process, their identity will undergo a process of reconstruction. Their ethnic cultural identity and American identity will continually be shaped, and new social identity will be built. Their children who are born in America will also face the identity problem since they grow up in between ethnic heritage culture and American culture.

The scientific research of immigration could be traced back to early twentieth century, and the understanding of assimilation reached the summit at the 1960s (Alba & Nee, 1997; Kazal, 1995). In the early literature of assimilation, ethnic groups were described to unlearn their inferior cultural traits to succeed in learning a new way of life for full acceptance. This kind of ethnocentric way to interpret assimilation has already been discarded. Segmented adaption was also observed, like Child (1943) proposed three main types of immigration: the “rebel”, the “in-group” type and “apathetic” reaction. However, this division still polarized their identity into American identity, ethnic identity or none. Later, bicultural identity was proposed to refer to immigrants who have the ability to combine two cultures. Over the past two decades, the importance of minority’s original culture has been highlighted (Mchitarjan & Reisenzein, 2014) and people’s competency of managing more than one culture has been strongly supported (Benet, Leu, Lee & Morris, 2002). Immigration has been more encouraged to retain their cultural heritage during acculturation (Portes & Rumbaut, 2001). While bicultural type people have a strong identification with two cultures, assimilated type people only have a strong identification with the host society (Benet et al.,2002). Compared with assimilation, bicultural people speak both languages, have friends from both cultures, and watch TV programs from both contexts. Beyond cultural behaviors, they can intermix their heritage and cultural streams, holding values from both (Schwartz & Unger, 2010). They can switch their behavior depending on the diffident cultural situation (Benet et al., 2002). And Nguyen & Benet (2013)’s research showed that there is a significant, strong, and positive association between biculturalism and adjustment both in psychological and sociocultural aspects, and this link is stronger than those who only associate with one culture (assimilation or separation). Biculturalism can help them be comfortable in both settings, use coping strategies from both cultures, even build advanced reasoning (Schwartz & Unger, 2010). Thus, bicultural identity should be viewed as a benefit and capital for immigrants, instead of a defect.

However, immigrants are still having difficulties in building a bicultural identity. During acculturation, a set of behaviors influenced by stress may occur, such as confusion, anxiety, and depression, which is related to family socioeconomic status and parent-child relations, English and foreign language proficiency, school attainment, experiences and expectations of discrimination, and ethnic identity and national origins (Rumbaut, 1994). Under this situation, it’s hard for immigrants succeeding in building bicultural identity during acculturation. They gradually lose their ethnic cultural identity and become assimilated entirely into host society in the end. This is a wicked problem associated with many stakeholders and has complex interdependencies, and seldom solution has been provided.

Governments, organizations, institutes, and designers have done practices to support ethnic groups in building the relationship with their ethnic culture. Canadian Multiculturalism Act was issued and has helped numbers of immigrants succeeding in transferring their language through three generations. In America, SAT Subject Tests include the option of Chinese, which encourages Chinese Americans to pass on their heritage language to children for succeeding in attending college. Museum of Chinese in America (MOCA) in New York exhibits collection, history, and heritage of Chinese American, along with diverse educational and cultural programs for visitors to participate. Culturally sensitive kitchen design for Mexican immigrants was illustrated in Hadjiyanni & Helle (2008)'s research. In these cases, government's effort is efficient and can increase the overall level of openness, yet it's usually dependent on the policymakers, which is easy to be changed due to leadership turnover. Non-profit has its limit on budget and museum is still a traditional way of giving education about culture. The existing solutions to the relationship between immigrants and their ethnic cultures are mostly top-down and policy-oriented, instead of that, more flexible, bottom-up, agile solutions are needed.

4.2 Methods

The study is presented through a one-year-long ongoing research and design work on Chinese Americans in New York City. Being bicultural for immigrants is more adaptive in gateway cities, where multiple cultures provide a distinct advantage (Schwartz & Unger, 2010). Thus, the pilot project here can be seen as the epitome of the accelerating, globalizing world where cross-culture situation is happening every day. Several qualitative research methods have been used in this research, including interview, questionnaire, literature review, and prototype.

4.3 User: The Identity Crisis of Second-generation

In the beginning, interviews with ten Chinese Americans in New York were done in order to get general views on the most common and severe problem regarding Chinese American immigrants' cultural identity. In-depth interviews about 45 minutes each have been done face-to-face or on the phone. Interview questions included their basic information, the community they interact with, activities in festivals, relationship with parents/children/relatives in China, the cultural gap in daily life, information source, education on kids, and expectation for surrounding cultural environment. And desk research about first-generation and second-generation Chinese Americans has been done to get a better understanding through previous research on this issue.

Next, five second-generation Chinese Americans between eighteen to thirty joined the second-round interview around their identity struggle both outside and inside their home. Four of them are college students or master students from New York University, School of Visual Arts, Pratt Institute and Columbia University, and another one already started working at a bank. The questions included their family information, education background, their parents' professions, acquisition of Chinese language, level of interest in Chinese culture, connection with relatives in China, the experience of going to China, cultural conflicts they ever encountered, and discrimination towards their identity.

Based on the result of desk research and interview, second-generation Chinese Americans became the target since they faced the problem of identity crisis most and struggled more than their parents. They always feel not belong to either of the two worlds. In general, acquisition of language, parenting attitude, relationship with relatives in China and close friends are the main factors that shaped their cultural identity. Specifically, the phenomena that second-generation has resistance with parents in the early period and they expect bridging the gap after the 20s is an intensive topic from the interviews. From the interviews the authors conducted in New York, below are what they said:

> *In the last couple of years, as I traveled back to China to see my families. And I mean I personally realized how important it was to be identified as a Chinese person regardless of having the American passport. (20-year-old Chinese American)*

There is a point that I really don't want to be associated with Chinese. After I got over that, I think I visited China alone with my mom during winter break, and just talked to my grandparents and got wonder about Beijing a lot. (20-year-old Chinese American)

It is a privilege to learn about two cultures. (24-year-old Chinese American)

Knowing where my parents are from, where are the cultures from, is very important for me to understand myself. (22-year-old Chinese American)

Despite defiance of adolescence, their mood and attitude are more stemmed from their bicultural background compared with other youth. Considering second-generation's formation of identity, Phinney (1990) proposed a three-stage model, including unexamined ethnic identity, ethnic identity search, and ethnic identity achievement. In the second stage, young adults are likely to have ambivalent attitude and search for the answer, because they need to deal with issues in a diverse social context after leaving home. Thus, second-generation Chinese Americans become the high potential *user* to be worked with. The two main reasons are:

- Second-generation immigrants are more prone to have trouble in constructing identities than their parents because they need to strike a balance between ethnic and national identities and try to establish bicultural identity.
- When the second-generation enters into their 20s, there will be a fault or weak connection between them and their parents' identity.

4.4 Content: The Value and Obstacle in Cooking Experience

As the ***user*** has been assured before, according to the UCED Model, ***content*** associated with food culture needs to be considered. In order to know food consumption of target users, an online survey has been done to know more about second-generation Chinese Americans' eating and cooking habits. Twelve Respondents' age range is between 18 and 35. Most of them are based in New York City. Below are the questions and scale of the answers (Table 1). The blank with no scale is for respondents to answer freely.

Table 1 Questions for survey

Question	Scale
What kinds of foods did your parents usually cook when you live with them at home?	"American food" "Cantonese Cuisine" "Sichuan Cuisine" "Jiangsu Cuisine" "Zhejiang Cuisine" "Fujian/Min Cuisine" "Hunan Cuisine" "Anhui Cuisine" "Shandong Cuisine" "Others"
What are the three favorite Chinese dishes for you?	
Do you know how to cook them?	
If you said "Yes", where did you learn it from? If you said "No", what's the reason that prevented you from learning it?	"Yes" "No"
How much do you know about Chinese food?	"1(very unfamiliar)" -"2"-"3"-"4(moderate)"-"5"-"6"- "7(very familiar)"
How often do you eat Chinese food right now?	"Almost every day" "Several times a week" "Several times a month" "Seldom" "other"

Do you cook Chinese food by yourself?	"Yes" "No"
What do you cook?	
How confident are you cooking a Chinese dish by yourself?	"1(Low)"-"2"-"3"-"4"-"5(High)"
Do you think Chinese food is your comfort food? Why?	"Strongly agree" "Agree" "Neither agree or disagree" "Disagree" "Strongly disagree"
Have you ever asked your family about the recipe they usually used?	"Yes" "No"
Could you remember the recipe and follow it successfully?	
How was the experience?	
What's the biggest problem for you to cook Chinese food?	

The data from the survey for second-generation Chinese American shows that half of the respondents' parents just cook Chinese dishes at home, another half cook different Chinese cuisine as well as American food when they were living with their parents. All of them agreed that Chinese food is their comfort food, and ten of them strongly agreed with that. The situation is they ate it growing up and eating Chinese food has been a habit for them. It's always something they can go back and enjoy, and it can remind them of family. Eleven respondents are familiar with Chinese dishes, however, in 5-level Likert scale, the average point for how confident in cooking is 3. Sixty-seven percent of them ever asked their family about the recipe, but the experience was not that great. Therefore, they love Chinese food, and they have strong emotion with it. However, they do not have enough confidence in cooking it, which stopped them from continuing this cultural practice. There are four biggest barriers for them - ingredients, time, complexity, and language.

Although cooking Chinese food is a little tricky, they still have deepest feelings about it. There are some exciting phenomena arose in the previous interview. For example, one interviewee said her mother brought a large amount of one kind of dried vegetable to America many years ago. Its name is "Fa Cai", which sounds like "make a fortune" in Chinese. Due to its propitious meaning, her mother took a little bit out and made soup of it during every Spring Festival for decades. There are also some other dishes that Chinese immigrants continue to cook. Like Stir-fry Rice Cake with Cabbage, it's a dish conveying a good wish, which Chinese people always eat in Lunar New Year, and Chinese Americans brought this eating customs during migration. Rice cake in Chinese means getting better in the coming year. Napa cabbage is beloved by Chinese because it originates from China and it has good nutrient content. In the old time, it was the only vegetable that Chinese people had, and it's suitable for long-term storage. One family usually stored several hundred pounds of cabbage to go through the winter. From this case, it's interesting to see that there are lots of reasons that people never think about when they make a choice. And the story behind the food can be a good design ***content*** which connects people with their memories and families.

In summary, in the aspect of *content*, access to ingredients, recipes have been the primary obstacles for targets users to keep their habit of cooking Chinese food, and abundant stories and past experience behind the Chinese food are their valuable memory. Thus, providing second-generation Chinese Americans with the available channel to retrieve their home culture and memory is what the intervention wishes for making an impact.

4.5 Experience: Design Opportunity for Creating Experience

In UCED Model, culture-orientated food design advocates providing the user with good ***Experience***. Ko et al. (2009) proposed a service innovation design model and established Our Museum, Our

Studio and Our Factory, which connected art, business, and creativity based on "Taiwan experience". In Japan, there was a service design for refugee's culture through story and cuisine aiming at encouraging Japanese users to learn refugee's life, which is a good reference for the current study. Service design adopts system thinking and solves a problem based on holistic consideration of the network, and it always put user as the first. In service design, good design on touch points and fluid experience in transition can increase user's satisfaction. Experience is the essence of a service, which coincides with how a person gets into the core of a culture. Practice and experience provide people with the channel to know the deepest meaning beyond tangible cultural objects. At this point, there is an opportunity for applying service design on culture issue to enhance user's experience. Besides, service design can provide a small, affordable, and cost-effective solution for SME business (Brooker, 2013). Thus, with low risk, service concept can be easily implemented compared with manufacturing and product, which is suitable for trial and error. The capability of connecting economic to the social and ecological is important in service design, in order to make the case being long-term and sustainable. Thus, a more independent, self-sustaining service designed for culture and food is promising.

4.5.1 Plan and Prototype

In the previous research, *user* and *content* have been defined among the UCED Model. The next step is to create compelling service. Three rounds of prototypes were done in the whole process to test how ***experience*** could be. All the prototypes were low fidelity, which used existing platform or simple graphics to guide users. The aim was to make sure their interests and to see what and how could stimulate user's motivation.

First Prototype: Three target users participated in the first prototype. It was a task for second-generation Chinese Americans that asking their parents about one family recipe of Chinese dish they would love to cook; then they gave feedback. Through observing how the testers call, record, purchase, and cook, the authors would like to know if making a favorite dish eaten at home can arouse their memory and they can get more story behind the food through interactions with their parents. Although the three participants said this process is valuable and meaningful, the pain points in the whole experience still exist. Parents always use the words like "a little" or "a few" when teaching, which is very vague and hard to control for them in the cooking process; similar ingredients are hard to distinguish in the supermarket; materials in the grocery store are too large in size or too much in amount; the dishes cooked according to recipes from parents do not taste like in their memory.

Second Prototype: In order to solve some pain points in the last prototype, the second prototype was a Chinese cuisine party for second-generation Chinese Americans (Figure 3). The party provided an opportunity for the target group to make the meal together with a professional chef. The Party's host, the author, selected a few popular dishes among Chinese-American and prepared ingredients and spices. A professional chef was invited to teach cooking at the party. The hypothesis was such a party can reduce part of the difficulties in the cooking experience. Furthermore, the second-generation Chinese might resonate with each other through the interaction with food. As a result, although authors sent the poster through various channels and invited guests face-to-face, there were only two participants attended. The main reason why this activity was not attractive enough was the long distance and the high cost of time.

Through these two practices, what can be learned is that it's hard to attracting user learning and joining the cooking activity proactively.

Figure 3 Poster of Chinese cuisine party

Third Prototype: In order to help users to remove barriers to food ingredients and recipes, we take the initiative to solve their problem of getting access to these things. By providing the prepared ingredients and recipes for the target user, we want to explore whether users will get interested in cooking Chinese food with time reduction. Then, in the third prototype, the author made an appointment with a second-generation Chinese and delivered the ingredients, spices, recipes, and stories of "Stir-fry Rice Cake with Cabbage" while she was free at home and observed her cooking process. The user made the dish in a short time and the feedback was good. The results showed that this kind of service by saving user's time, providing access, and creating convenience could become a viable design outcome.

4.6 Design: Service for Strengthening Cultural Identity via Culture-orientated Food Design

Based on all the studies, the concept of Foodtale (Figure 4) came up, which is a delivery service of prepared Chinese dish's ingredient, using storytelling way to introduce the story behind the food. Using food to evoke self-reflection, Foodtale encourages second-generation Chinese Americans to keep their Chinese food eating habit and cook Chinese dishes more. The process makes them getting more interests and confidence, further influencing their connection with their cultural identity.

Users can browse foodtale.us online (Figure 5) to look for Chinese dishes they like. The website includes the favorite and typical Chinese dishes and tells the stories of where they come from. Users can order dishes online and they can choose the time they are available to be delivered. And then, a box with ingredients, recipes, a map and story's illustration will be delivered on time to a specified location. Foodtale is also a platform for target users to recall their memory about the dishes from home and it provides useful information for them to buy Chinese ingredients nearby.

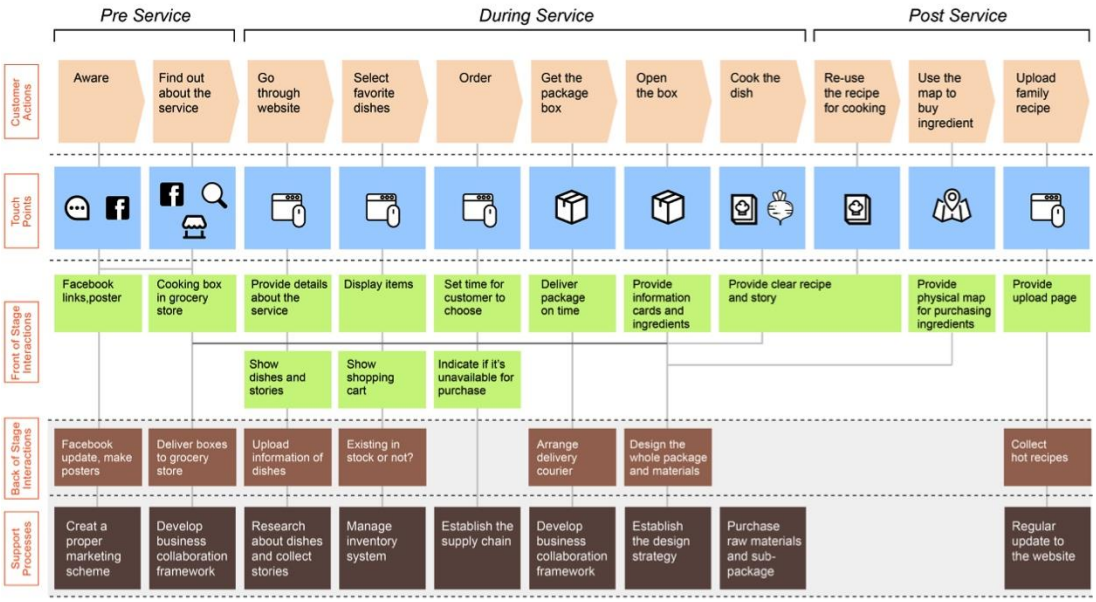

Figure 4 Service blueprint of the solution

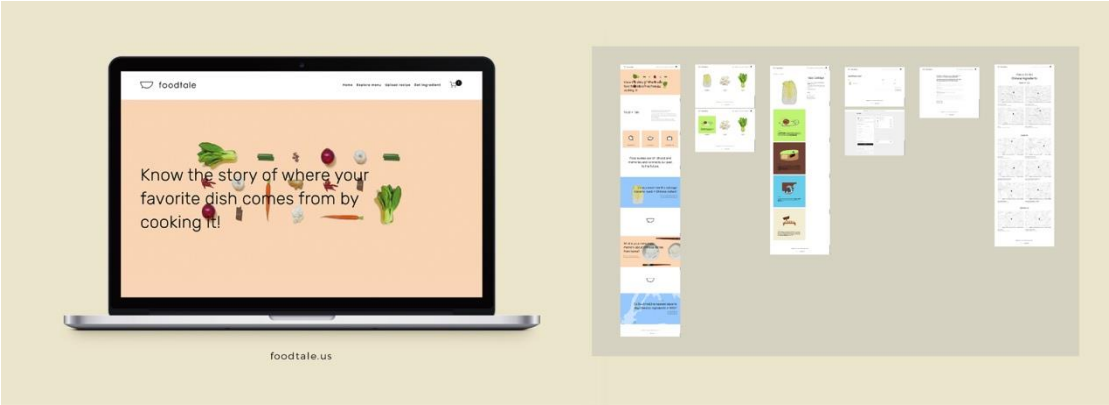

Figure 5 Foodtale's website

Figure 6 Foodtale's pilot materials

4.7 Pilot and Evaluation

After the digital platform had been done and the food box (Figure 6) had been prepared, the service was tested and iterated for three times (Figure 7). The test process adopts the think-aloud strategy. Two main questions are concerned in the process:

- Function: Can users interact with the service and products smoothly? Is it convenient and useful for them?

- Emotion: Do this experience and the information inside of the box make an impact on target users?

Figure 7 Participants ordering and cooking foods

On the aspect of function, participants did not have much problem of following the recipe and cooking it. One person asked for more visualization of the story and information in the box.

On the aspect of emotion, the experience made users talk and think more about their identity. One girl talked to me about her experience as a second-generation to me at the end：

> *I'm American born Chinese, but I feel I'm not that connected, especially when I'm away from home. My grandparents always came and took care of me when I was a kid. They taught me Cantonese, and they cooked Cantonese food. I like this way. The process reminds me a lot.*

She talked about her favorite food freely and expressed her willingness to learn more. Another man said this whole experience made him learn more about Chinese food and learn more about his heritage. He said:

> *The next time I go to grocery store, I will keep a lookout for some of these ingredients. I would love to try more.*

By removing the barriers of convenience and access, the service provides an integrated experience for users, which facilitates people to get a better acquaintance with their cultural identity from tangible food to its inner cultural meaning via practice. Food becomes a good medium that evokes their childhood and memories and connects their past to the future. Foodtale is a service that second-generation Chinese Americans can go back to when they miss. It's a place they are free to talk and discuss the food, their family, and their identity. For a minority, beyond totally assimilating to the majority, knowing more about who they are and where they come from can help them to be confident in their bicultural identity.

4.8 Discussion on the Use of UCED Model

The UCED Model is a framework to do culturally significant design for food. In the paper, it is used in designing activities that target Chinese immigrants as the specific audience. For this group of people, the specific cultural issue to discuss is how to enhance cultural identity through food design.

In the design process, "target ***user***" and "cultural ***content***" are two elements that must be clarified for designing, and this became one of the biggest challenges throughout the research. How to make the decision is dependent on the ubiquity of the problem, availability of access and possibility for design option. Based on the user-centered feature of design discipline, the constant contacting with a certain group of people made sure that the needs and demands were real. And the ***experience***-oriented design makes sure that user has a better engagement and trigger users reflecting in action. Food, as an object, which is made and consumed every day, also has a unique advantage in providing experience. The final ***design*** concept for second-generation Chinese American, as a socially beneficial service, creates a new probe into minority's culture issue, which is different from existing solutions and can be economically sustainable on its own.

There were surely some limitations of the work. Firstly, although users gave positive feedbacks on Foodtale, as a project which was aimed at raising awareness, the long-term impact remains to be seen. Next, this solution is on an individual level, which wished to create self-reflection. As the cultural issue is a multi-stakeholder problem, the interaction of multiple users can be explored next. Also, apart from service, more research may need to be done from cuisine, food chain, etc.

5 Conclusion

In this paper, a UCED (User-Content-Experience-Design) model is proposed for designing culturally significant food to enhance minority and marginalized groups' cultural identity. Centering on culture, the four parts of the model include targeting user in the culture, choosing cultural content, creating a cultural experience and designing product, service or system with cultural meaning.

A case study of delivery service of Chinese food for second-generation Chinese American was described. The feedback from target user showed that the service could connect them with their ethnic cultural identity. The case is an intrinsic case that examined the relationship between second-generation immigrants in New York with food and culture, but in fact, it developed into an instrumental case study through seeking to understand the issue of resolving the diminished cultural identities of minority (ethnically) groups by food design. UCED Model can help to frame research areas and provide rich and informative design clues in the food design process.

As future works, based on UCED Model, more concrete approaches can be explored, and practices can be implemented to produce more insights for culture-related solutions for society.

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Section 8.

Design Innovation Management

DRS 2018 Design Research Society 2018 Catalyst

University of Limerick
25th–28th June 2018

Editorial: Design Innovation Management

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In these proceedings Design Management Innovation is covered by 21 papers. These are covered by three sections which are can be find in Volume 2 (this sections), Volume 5 which clustered papers around *Design in Open Innovation* topic and Volume 7 with focus on *How Organisations Employ Design as Vehicle for Change.*

This section features the following 8 papers:

Emilene Zitkus *at al*. in paper titled *Understanding How Design Action Plans Support the Strategic Use of Design* outline the strategic use of design at the national level to drive economic and societal impact benefits from coordinated activities that integrate and apply key stakeholder agendas. The overall aim of the research project is to develop an integrated action plan for design in the UK with a goal to achieve a greater recognition and application of design as a strategic driver of innovation. The paper concludes that overall the language and structure of design action plans vary considerably as does the focus.

Anna Whicher and Alex Milton outline key steps undertaken by the Department for Jobs, Enterprise and Innovation to initiate a National Design Strategy for Ireland.

Heloisa Candello with her colleagues from IBM investigated informal credit practices of merchants in the northeast of Brazil. They observed that the informal credit practices are based on a sense of community and personal relationships between merchants and their customers. They conclude that that business transactions are forms of social and cultural exchanges which are shaped by local moral and cultural norms.

Myrthe Montijn *at al.* in their paper titled *Matching Data and Emotions for Designing Personalized Digital Experiences* argue that the digital innovations in-store are often unnecessary, unintuitive and uncomfortable and mostly make use of personal data for one-way messaging instead of meaningful interpersonal interactions. To counter this identified gap, they build on the work of Pieter Desmet (2002) to improve consumers' in-store digital experience and their emotional connections with the brand to leverage the opportunities of personal consumer data in personalization strategies.

Mark Bailey *at al.* argues that using a design-led approach is highly beneficial when tackling complex problems to transform ambiguity into actionable design briefs and solution opportunities. Their main objective is to develop and deploy approaches to innovation that apply skills from creative graduates to benefit the wider creative economy, address barriers to innovation and promote growth and sustainability within and without of the Creative, Digital and IT sector.

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Paper titled *Determinant Moments for the Design Management Occurrence in Fashion Industry* written by Cláudia de Souza Libânio *at al.* tried to systematize the process of product development, identifying the players and their competencies involved in the apparel industry and mapping the determinant moments for the design management occurrence in context analysis. They conducted interviews with 14 respondents. Analyses of the interviews identified the determinant moment for the design management which foster design as a vehicle for change, in apparel industry companies.

Roberta Rech Mandelli with her fellow researchers examined whether professionals with different backgrounds use distinct thinking styles when designing a product. They used the concept of the Design Thinking Style Inventory (CD-TSI). They have identified that engineers favour the conditional thinking style (accepting opinions from others without questioning them), designers prefer the exploring style (seeking for options and differentiation), while both designers and architects lean towards the creative style (thinking in parts to get to the whole concept).

Kathryn Burns examined four knowledge exchange projects undertaken over the past 15 years between university and external commercial organisations. She has concluded that: (i) The effective transfer of design knowledge depends on the capacity of a company in addition to the identification of the most appropriate support. (ii) Weaknesses in marketing are a greater priority than design for most SMEs – gaps in marketing ability were having more critical impact than design issues in a company reaching its full potential. (iii) A company's external environment and competitors are an overlooked source of opportunities for growth. There is a general lack of knowledge regarding how observing a company's external trends (e.g., social, technological, environmental and political) can point to opportunities or threats to a company's performance. and (iv) The effective transfer of design knowledge depends on the capacity of a company in addition to the identification of the most appropriate support.

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DRS 2018 Design Research Society 2018 Catalyst

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Understanding How Design Action Plans Support the Strategic Use of Design

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The strategic use of design at the national level to drive economic and societal impact benefits from coordinated activities that integrate and apply key stakeholder agendas. This study is part of a large research project that aims to develop an integrated action plan for design in the UK, generating insights that go beyond existing approaches in order to achieve greater recognition and application of design as a strategic driver of innovation. Drawing upon Nagy and Fawcett (2003) 'VMOSA' strategic planning process, the paper systematically analyses six European Design Action Plans (DAPs) to better understanding the key components required of action plans. The analysis demonstrates that while DAPs vary significantly in their format, structure and articulation of actions, the insights generated directly inform understanding of how these plans can effectively support the strategic use of design in the public and private sectors in the UK.

design action plan; design strategy; design policy; innovation.

1 Introduction

This paper presents part of an ongoing research investigating strategic ways to maximise the use of design in the United Kingdom through the development of a tailored UK Design Action Plan. The research is a collaboration between Manchester Metropolitan University and Cardiff Metropolitan University funded by Arts and Humanities Research Council to develop an action plan for the strategic use of design in the UK. The paper begins by reviewing what an action plan is and what design can learn from how action plans are utilised in other areas. This understanding can then be employed to inform the process of developing an action plan, as well as key elements that constitutes and are essential for action plans to be effectively implemented. Thus, by having framed the important aspects to consider in actions plans it will be possible to propose actions for design.

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1.1 Research Context

In the UK, design is recognised as a strong and important contributor to the economy. The design sector grew by 16.2% in three years and its gross value added (GVA) increased by 8.0% in the same period compared with 5.4% for the UK economy as a whole, even faster than the financial services sector (DCMS, 2014). In 2015, design contributed to £71.7bn GVA to the UK Economy (Design Council, 2015). Research has demonstrated that UK businesses invest more in design (£50bn) than R&D (£15bn) (Moultrie & Livesey 2009; Eurostat, 2012) and according to the NESTA Innovation Index (2009), more innovation was generated by investment in design (17%) than traditional research and development (11%).

The increased attention that design has received from the European Union and several member states in particular, forms a backdrop for this study. While traditionally innovation has often been considered a technology-focused, R&D-driven activity, in recent years the EU has recognised the broader contribution design makes beyond traditional areas of technological focussed innovation. Understanding of the potential of design to drive service innovation resulting in service improvements as well as product innovations in both the public and private sectors continues to increase. The European Commission (EC) distinguished design as one of ten priorities for innovation in the 'Innovation Union' while stating that Europe's strength in design and creativity should be better exploited (European Commission, 2010). In 2011, the EC established the European Design Leadership Board (EDLB) that resulted in delivering enhanced evidence of the increasing recognition of design in the political agenda in Europe, proclaiming "never before has so clear an opportunity existed as now, for the European Commission, Member States and regions to take bold action to enable a new level of awareness about the importance of design as a driver of user-centred innovation across Europe" (EDLB, 2012:5).

Within a UK context, measuring the value of design has always been a pillar of the UK Design Council's work (McNabola, 2013). They have published widely on the value of design at enterprise (micro) and sector (meso) level demonstrating that "design can have a positive effect on all business performance indicators, from turnover and profit to market share and competitiveness" (Design Council 2007:12). However, design still remains under-utilised as a tool for innovation by the UK Government partly due to lack of suitable metrics and indicators for national design impact or effectiveness (DeEP, 2013), which would thus demonstrate the value of design at national (macro) level.

Nevertheless, broadly, design is recognised as a driver for innovation (Innovate UK, 2016; DeEP, 2013; European Commission, 2013) and economic success (EDII, 2012) and as such is of key importance to national competitiveness and prosperity (European Commission, 2009). Swann (2010) has previously made the economic case for a national design policy in a paper for the UK Department of Business, Innovation and Skills. Swann (2010:23) identifies specific design policy options "worthy of support from public funding" including the creation of national design assets; support for the design of complex systems and standards for design; strengthening the design profession; public expenditure on design, with stronger IP and tax credits; and support for design education. While Swann recognised the positive impact of design to UK competitiveness, little has been done to ensure that design plays an integral role in the national level, and thus their strategy has yet to be implemented. Clearly there is an opportunity to extend an economically driven case to also including the potential of design to address societal challenges (such as enhancing wellbeing, social cohesion, human experience, etc.) and as such deliver innovative solutions for products and services in the public as well as private sector.

Whicher and Walters (2014) claim that there is a need for approaches that explicitly support and promote design at a regional and national level, moving beyond the focus on micro level activities. At present, there is no clear consensus of what such a strategy for design at a national level should include; how it would be implemented; who would be the main actors and beneficiaries; what the impacts would be; and critically, how this would become manifest in an 'actionable' plan for design.

Demonstrating the commitment to design, the European Design Leadership Board made "recommendations on how to enhance the role of design … at the national, regional or local level and to develop a joint vision, priorities and actions, and thenceforth to integrate design as a part of innovation policies in Europe" (EDLB, 2012:5). Since then, the EC "seeks to actively promote design's relevance and value as an enabler of innovation amongst Europe's enterprises, public sector organizations and policymakers" (Evans and Chisholm, 2016:256). One way defined by EC was through Action Plan for Design-Driven Innovation (2013) thus an understanding of action plans and their role in design is warranted.

2 Action plans

Action plans identify detailed and specific steps that can be implemented to achieve organisational strategic visions (Baker and Taylor, 2007; Monks, 2011) or personal goals (Austin and Vancouver, 1996; de Vries, 2013). They are also considered as a way of effectively solving problems in various settings in both private and public sectors (VanGundy, 1988). In a corporate environment, action plans typically include company strategy, annual budget and investment programmes, and are used to monitor the progress of the action plan (Monks, 2011). Action plans are also one of most frequently used techniques for health promotion programmes as a planning intervention (Hagger and Luszczynska, 2014). Governments and non-profit organisations also often use action plans to provide credibility to the intention to change and to ensure important details are not overlooked (Baker and Taylor, 2007). The variety of contexts in which action plans are employed mean that it is difficult to define precisely what constitutes an action plan. Hagger and Luszczynska confirm that "there appears to be no definitive definition of action planning in the literature" (Hagger and Luszczynska, 2104:9). Therefore, it is beneficial to the scope of this research to contextually understand the Components of action plans in order to create an effective framework to underpin the development of a national design action plan.

2.1 Strategy (Action) Planning

The process of creating an action plan includes identifying problems in detail with contextual awareness and exploration of possible solutions. Once created, the action plan should be assessed for its effectiveness (VanGundy, 1988). Community Tool Box from the University of Kansas describes this development process in more detail, where the action plan is part of a strategic planning process (or sometimes referred as action planning process), structured around the VMOSA process - Vision, Mission, Objectives, Strategies, Action Plans (Nagy and Fawcett, 2003). Each stage of the process (Table 1) involves ensuring the integrity of overarching aim is delivered through the actions applied.

Table 1. VMOSA Process Descriptions (Adapted from Nagy and Fawcett, 2003)

VMOSA Steps	Descriptions	Examples
Vision	Brief proclamations that covey ideal future with beliefs and governing principles of an organisation to the stakeholders.	"Education for all," "Safe streets, safe neighbourhoods"
Mission	Description of what the organisation/ initiative is going to do and why with concise, out-come oriented, inclusive statement.	"To develop a safe and healthy neighbourhood through collaborative planning, community action, and policy advocacy"
Objectives	Referrers to specific measurable results for initiative's broad goals consisting of behavioural, community-level outcome or process objectives.	"By 2012, to have made a 40% increase in youth graduating from high school," "By December of this year, implement the volunteer training program for all volunteers"
Strategies	Explanation of how the organisation/ initiative will reach the objectives (includes broad and specific strategies).	"scholarship offers to students who would be otherwise unable to attend college"
Action Plans	Detailed description of how strategies will be implemented to accomplish the objectives with specific changes and action steps.	Plans including Action Step, Person(s) responsible, Date to be completed, Resource required, Potential Barriers or resistance, Collaborators

There are many possible descriptions of the steps identified in VMOSA process as the semantics of each term differs depending on different authors and theories being drawn upon (e.g. Michael Porter's Competitive Strategy). However, this research uses the description provided by the Community Tool Box because of its close relevance with action plan formulation. The vision, mission and objectives, also can be classified as a 'goal', provide an overall concept of what is trying to be achieved which can apply to a whole organisation or an individual initiative. Setting these 'goal' is important because it distinguishes the type of plan between "if-then" plans which are situation dependent action plans, and "implementation intension" that focuses on desired outcomes and end-state (Hagger and Luszczynska, 2014). Following stages of the VMOSA are the strategy and action plan which are classified as implementation stages where specific targets are set and provides 'how' the strategic planning can achieve the 'goals' identified in the development process. Especially in the stage of creating an action plan, stakeholders (or interest group) should be included to ensure the action plan being developed provides feasible problem-solving action steps that can be implemented by or for the stakeholders (Nagy and Fawcett, 2003). The VMOSA process, therefore, is valuable in creating a shared understanding among the stakeholders of the importance and necessity of changes required to overcome the identified problem.

2.2 Components of an Action Plan

The components that are required in an action plan can vary depending on the usage and the situation which the action plan tries to address. Nonetheless, it is important to create a comprehensive list of the components as it can be used to conduct state of the art research and be used to establish a framework to provide the focus and establish parameters (Rallis and Rossman, 2012). Drawn from various context including academic research (Fleig et al, 2017), business (Bradt et al, 2011), community organisations (Nagy and Fawcett, 2003) the Government (Innovate UK, 2014) and local community/authorities (City of London, 2016) key components of action plan are summarised in table 2:

Table 2. Key Components of an action plan

Key Components	Description
Actions (What)	Actions that will occur through the action plan
Responsibility (Who)	Person / department / members who will be responsible for carrying out the action(s)
Duration and deadline (When)	By when the proposed actions/changes will occur, including start and end date
Location (Where)	Location of where the action will take place
Measure/Outcome	Measurable outcomes expected from the actions
Barriers (How)	Potential barriers or resistance to the actions and plan to overcome them
Resources available/needed (How)	Resources (e.g. funding, staff) currently allocated and necessary to implement the actions
Communication/ Collaborators (How)	Communication plan including who should know and what information should be provided

The components relate to specific actions, timeline and people responsible as well as contextual issues such as potential barriers and communication/collaborators. Depending on the specific purpose, the components used in action plans vary, however, in order for the action to be successful, it is necessary for action plans to be specific and thorough (Nagy and Fawcett, 2003). Therefore, consideration should be given to include all relevant components identified in order to create an effective action plan. One example is inclusion of measurable the outcome - found in some action plans where the outcome of an action proposed can be measured and provides acceptable targets such as "number of youth offenders accessing interventions Youth justice settings" and "E-safety workshops held in schools" (City of London, 2016:10). This provides a mechanism to monitor the effectiveness of actions which is important to ensure action plans are effective against stated aims.

2.3 Action plans in design

It is increasingly being recognised that design provides important value for businesses (Rae, 2013) and for the national economy (Design Council, 2015) as well as being an important mechanism for driving innovation (Innovate UK, 2016). However, the rate of take-up of design by businesses and governments has been acknowledged by policy makers as problematic, which in Europe informed the establishment of the European Design Leadership Board with a remit to create an action plan to accelerate the take-up of design (EDLB, 2012). For design, the use of action plans could provide analytic frameworks to understand the capacity of design to drive innovation and promote awareness of the value of design to users and other stakeholders whilst creating specific actions that require implementation. However, there has been limited study of design action plans and thus what constitutes good practice is only partially understood. Therefore, further study of the current use of action planning in design will help better define the current state-of-the-art in order to create more effective frameworks for future development.

Drawing upon Rallis and Rossman's (2012:92) model of a conceptual framework for data analysis (and in the context of the 'Developing an Action Plan for the Strategic Use of Design in the UK' project), our research uses the principle of framework in two parts: (i) the initial exploratory stage investigates the principles of a design action plan, and (ii) further studies will conceptualise the findings with additional research to create a framework as part of developing an effective design action plan for the UK. This paper therefore presents the analytical framework of an action plan based on the VMOSA process and the key Component of action plan identified through the exploratory literature review. The goal of the study is to identify elements that contribute to a clear format and achievable actions in a national plan.

3 Design Action Plans across Europe

In recent years a number of countries across Europe have developed design action plans (or similar policies or strategies) to better utilise and integrate design into their innovation eco-systems. Scherfig et al. (2010) notes that Denmark has produced national design policies since 1997 although the focus of these policies has evolved over the years and, as a result, four design policies have been developed between 1997 and 2013. Other European countries have followed the same path in producing design dedicated official documents. Although these documents vary in their names, some of them formally named Design Action Plans, others Design Strategy or Policy Framework, they aim to promote design in their country. Thus, it is important to understand what has been proposed through these documents, what are the scope of such plans, the type of actions proposed, etc. The next section is an initial analysis of some of the design action plans developed in Europe.

3.1 Six European DAPs

This research is part of an ongoing project investigating ways to develop an action plan for the strategic use of design in the UK. During the initial stage of the project, six design action plans from European countries were selected and analysed to enable an understanding of a range of approaches currently being utilised. The main criteria for the initial selection process was the availability of an English version of the action plan thus excluding countries including Italy (Italia Creativa, 2014) and France (Pour Une Politique Nationale de Design, 2013). Also, this initial excluded excludes dedicated regional level action plans, such as design policies formulated to the Italian region of Lombardia (Mortati et al, 2016) and the Belgium region of Flandes (Valcke, 2010). Finally, the study initiated with design action plans formulated in the last five years to enable a contemporary perspective to be developed, which resulted in the below six documents:

- European Commission (2013): Implementing an Action Plan for Design-Driven Innovation;
- Denmark (2013): Denmark at Work - Plan for Growth in the Creative Industries · Design;
- Estonia (2012): National Action Plan for Design 2012-2013;
- Finland (2013): Design Finland Programme - Proposals for Strategy and Actions;
- Ireland (2016): Policy Framework for Design in Enterprise in Ireland;
- Latvia (2014): Creative Latvia 2014-2020 - Design Strategy.

It should be noted that this paper presents the initial steps in understanding the components of effective design action plans, and future research will encompass more comprehensive DAPs in order to be representative of what has been proposed as design action plans at a national level. Moreover, as our research develops we will extend our time horizons beyond the last five years in order to include the British design action plan such as 'The Good Design Plan' developed in 2008 (Design Council, 2008), the 2011 'Design for Innovation' and other relevant documents.

3.2 The DAPs Format

The six DAPs presented here differ in their format or in the way, they present future actions to support design growth. In some cases, the documents start with a report of the current scenario of the design sector in the country (i.e. Policy Framework for Design in Enterprise in Ireland). In others, it includes the proposed actions to be taken by the design sector, followed by a report of the economic value of design (i.e. Denmark at Work: Plan for Growth in the Creative Industries · Design). For example, Latvian Design strategy starts by presenting the current scenario through a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the current design sector. In the Latvian document, the initial section (around 30% of the document) is followed by a design strategy, which presents the vision for design and the necessary actions. Differently, in the Irish document, the economic value of design and its contribution to the business sector represents the major part of the document; whereas a section dedicated to the six objective actions for design is ten percent of the document. Other documents are more objective. For example, the Action Plan of the European Commission for instance, defines and contextualises design in the two initial pages only (approximately 16% of the document), the other 10 pages are dedicated to objectively describe the

actions. Similarly, the actions are presented very objectively in the Finish Strategy, though the document is longer and in more detail than the EC action plan. Around 40% of the Finish document highlight the actions for design, with the most of the other parts contextualising design and presenting the vision for 2020. Our analysis (albeit in a small sample) has identified a wide range of different approaches to the format, structure and focus of the various action plans. Table 3 summarises the format of the six DAPs.

Table 3. DAPs format

DAP	Contextualising Design (approximate % of the document)
European Commission	16%
Denmark	70%
Estonia	50%
Finland	60%
Ireland	90%
Latvia	30%

3.3 The Purposes of the DAPs

The DAPs vary in their purposes. Although all six DAPs aim to maximise the take-up of design in at least one sector (as can be understood through the actions proposed), the purpose of the documents are stated different. In some of the DAPs their purpose is clearly stated; whereas in others, it is missing or it is described in terms of its development and contribution to economic growth of design sector. A summary of the key driver for the purpose of the action plans are outlined below:

1. The EC Implementing an Action Plan for Design-Driven Innovation states that its aims are "to accelerate the take-up of design in innovation policies and to create the capacity and competencies needed to implement these policies." (European Commission, 2013:6)
2. The Danish "Plan for Growth in Creative Industries & Design has been drawn up on the basis of recommendations made by the Growth Team for Creative Industries & Design and with contributions from a wide circle of stakeholders from the creative industries." (The Danish Government, 2013:2)
3. The Estonian "National Action Plan for Design 2012-2013 sets out the main courses of action, most important principles, specific activities and programmes for promoting the development of design and for removing shortcomings that hinder development in the immediate future." (Estonian Enterprise Policy, 2012:21)
4. The Design Finland Programme - Proposals for Strategy and Actions, defines its purpose as "to improve the competitiveness of Finland through design competence and its effective utilisation… These include the capacity of businesses to survive in intensifying global competition, user-friendly public services and a clean living environment and nature… the vision and strategy of the programme will be implemented through 29 actions. The target year for the Design Finland vision is 2020." (Ministry of Education and Culture, 2013:11,15)
5. The Policy Framework for Design in Enterprise in Ireland "focused on enhancing design activities in the enterprise base in Ireland, and was developed as part of the legacy of ID2015." (Department of Jobs, Enterprise and Innovation, 2016:2)
6. The Creative Latvia 2014-2020 - Design Strategy does not state the purpose or intention of the strategic plan, instead it starts with a SWOT analysis followed by actions.

By stating their purposes each country demonstrates the different approach taken when defining actions, whether they consider implementation, responsibilities, resources and so on. The DAPs indicate the following:

1. The EC DAP describes four elements of an Action Plan: action, capacity (which may include resources and/or collaboration) and competencies (responsibility) for its implementation;

2. The Danish focus on its contribution to the creative sector, instead of describing the depth of considerations around the actions;
3. The Estonian DAP presents two components of its plan: actions and programmes (which may involve resources, duration, collaboration and responsibility for its implementation);
4. The Finish presents its plan in more general terms based only on actions, without details of other components;
5. In the Irish DAP the focus is on actions only; and
6. The Latvian DAP does not define its purpose or the components.

Format and purpose are only two of several differences among the six DAPs. The VMOSA process described in Table 1 and the key components of an action plan presented in Table 2 are used to further understand the differences of the six European DAPs. The analysis allows consideration on what is important to include, develop and implement in a comprehensive action plan for design in the UK.

4 Design Action Plan Analysis

The analytical framework presented below is used to understand the selected DAPs in two stages. First, through the VMOSA process we can understand the development of action plans through consideration of four aspects - vision, mission, objectives, strategies - and then the action plan (Nagy and Fawcett, 2003). Second, through the eight key components that contribute to an effective action plan, which includes the action itself; responsibility; duration; location; barrier; resources; communication and measure (City of London, 2016).

4.1 VMOSA process

In this section, the six-selected European design action plans are analysed through the VMOSA process to understand to what extent they cover the four aspects before proposing the necessary actions.

Table 4. VMOSA Process among the six European Design Action Plan

VMOSA Steps / European Design Action Plan	Vision	Mission	Objectives	Strategies	Actions
European Commission			X		X
Denmark	X				X
Estonia	X		X		X
Finland	X		X	X	X
Ireland					X
Latvia	X		X		X

Although the six DAPs vary in terms of format, with some dedicating 50%, 60%, 70% and even 90% to contextualise the design sector before proposing actions (see table 3), they do not necessarily all cover the four aspects of the VMOSA process. For example, the Danish DAP presents a report related to creative industries in 70% of its content, in which a vision for creative industries is presented. However, the other aspects - mission, objectives and strategies - are not included. Another example is the Irish DAP where approximately 90% of its content relates to the economic value of design, which does not cover any of the four aspects of the VMOSA process that precedes actions. The Finish DAP is the one that covers most of the VMOSA process, presenting three aspects – vision, objectives and strategies – before proposing actions. Mission, however, is the aspect missing, not only in the Finish DAP, but also in all the others.

4.2 Key components

Another way to analyse the DAPs is to understand whether they cover the key components presented in Table 2. This table presents eight components that could contribute to an effective

Action Plan: actions; responsibility (implementers); duration (deadline); location; barrier; resources; communication (collaboration); and, measure (outcome). Interestingly, although the definitions of the purposes of the DAPs do not present the approach of the DAPs, closer analysis shows that in some cases the action plans present more of the key components, beyond the actions only. For example, although the Latvian DAP does not specify its purpose, the actions are followed by responsibility (implementers), collaboration, resources and in some cases its duration (implementation). Similarly, with the Finish DAP, which presents its purpose in more general terms, the 29 actions encompass at least three other key components: responsibility (implementers), duration and collaboration (implementation). Thus, the analysis of the key components presented in the table 5 are related to the entire document, covering how the majority of the actions are approached – whether the eight key components are addressed or not on the majority of the actions.

Table 5. Key components of an action plan across the six European Design Action Plans

Key components / European Design Action Plan	actions	responsibility	duration/ deadline	Location	resources	communication/ collaboration	barrier	measure/ outcome
European Commission	X	X	X		X			
Denmark	X							
Estonia	X	X	X		X			
Finland	X	X	X			X		
Ireland	X							
Latvia	X	X			X	X		

This table demonstrates that none of the DAPs presents all the key components. In fact, location, barrier and outcomes are not part of any of them. The other components, such as responsibility, duration, resources and collaboration are in four of the DAPs. However, apart from the Finish DAP and EC DAP, in which every action follows the same structure, the other DAPs are not consistent. For example, Latvian DAP presents a timeframe for a third of the actions, thus the duration is not included in the table 5, as it is not consistent in the whole document. Similarly, in the Danish DAP, responsibility is part of few actions, not in the majority of the actions, and therefore, it is not in the table above. On the other hand, although responsibility, duration and resources are not presented in every action proposed in the Estonian DAP, the majority present these components, and thus they are included in the table. The Irish DAP only states the actions without any reference to any other component contributing towards its implementation. In summary, the analysis found that:

- the VMOSA process helped to understand the DAP documents as a whole, to understand how their format could contribute to consolidate a plan, clarify the intension of the actions and add credibility for what has been proposed. None of the DAPs considered vision, mission, objectives and strategy jointly before proposing the action plan.
- the Key Components assisted in recognising that the six DAPs differ considerably in terms of structure and details composing each action (how, when, who, where). None of the DAPs presented the eight key components jointly, and in most of the cases, only few details supported the implementation of each action. Additionally, the actions vary significantly in every document, which calls for better understanding of the DAPs.

These observations present a number of key questions for further investigation:

1. How do the actions link to the achievement of stated goals?
2. What are the applications of the actions in different DAPs?

3. Who are the beneficiaries of different DAPs?
4. Is there any correlation between the level of details (Key Components) of each action and the beneficiaries?
5. Who is responsible for the implementation of actions?
6. What is the role of the vision in the DAP? Does it affect the actions proposed?
7. What do the differences among DAPs tell us about the strategic degree attributed to design at a national level?
8. Is it more effective to have Design Action Plans or to have design integrated into Innovation Policy?

The next stage of the project will be to focus on in-depth analysis of a wider range of DAPs – including French and Italian – and the questions raised in this paper, contributing to the creation of a conceptual framework as part of developing an effective design action plan for the UK. Also, further research will focus on what contributes to successful DAPs, considering the domains of design being addressed in the plans (whether it encompasses architecture, information technology or other areas).

4.3 Limitations

One of the limitations of analysing the DAPs is the lack of authorship or acknowledgment of the stakeholders involved in the developing process. Apart from the Finish DAP which refers to the procedures taken for its development in the introduction and details them in one dedicated appendix, giving the names of institutions and leading individuals involved in the process, none of the other five DAPs detail the procedures contributing to final plan. The Irish DAP has a footnote referring to a stakeholder workshop conducted as part of the development of the actions, and the Latvian states the name of the DAP authors. This limitation unable us to understand the extent of which representatives of the design sector had their needs and expectations addressed in the DAPs and to investigate what was meant to be achieved with the DAPs, as the objective is not always clear in the documents.

5 Conclusion

This paper has discussed the notion of national Design Action Plans as initiatives to support, promote and implement activities that enhances the take-up and use of design across public and private sectors. It proposes that a DAP for the UK would be beneficial to the economy and therefore has presented an analysis of DAP's from the EU and five national plans using an analytical framework based on the VMOSA process. As a preliminary exercise this analysis investigates the differences among DAPs across Europe, highlighting key components of the DAPs development process, as well as components that are part of each action proposed. It has demonstrated that the DAPs vary significantly in their format, structure and detail of actions. The investigation has also demonstrated that the outlined two-part framework is effective as a means to analyse components of the DAPs; however, it also highlights a need for further study in which individual actions of every DAP can be analysed against the framework. This initial study has identified a number of further questions for study and has illustrated overall that the language and structure of design action plans vary considerably as does the focus. In order to develop a DAP for the UK, it is clear that these questions need investigating with a number of stakeholders in order for any proposals to gain traction and influence.

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Journey Towards an Irish Design Strategy

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In February 2017, the Irish Minister for Jobs, Enterprise and Innovation, launched the consultation paper towards a National Design Strategy 'Ireland – The Design Island' produced by the Design and Craft Council of Ireland. At the launch, the Minister, Mary Mitchell O'Connor T.D., stated that the consultation paper contained "a list of issues that need to be examined, from quick wins to long-term strategic goals" for developing Ireland's design capacity. This political commitment to design is a significant milestone on the journey towards an Irish Design Strategy. A number of other significant steps have already taken place including the Year of Irish Design 2015 and the 2016 Policy Framework for Design in Irish Enterprises. Based on 14 interviews with a range of stakeholders across the Design Ecosystem, the authors have mapped the significant milestones in the process of developing policy actions for design in Ireland. Mapping the journey towards an Irish Design Strategy might provide insight for other researchers, policy-makers and stakeholders seeking to influence design policy.

Design Policy; Design Ecosystem; Irish Design; Innovation Policy;

1. Introduction

In the last few years a number of key milestones have taken place on the journey towards a National Design Strategy for Ireland instigated by the Department for Jobs, Enterprise and Innovation (DJEI). Notably, design has been integrated into the annual Action Plan for Jobs, DJEI invested €5 million in the Year of Irish Design 2015, it commissioned three research studies on the value of design, Enterprise Ireland piloted new design support programmes and in 2016, DJEI published its 'Policy Framework for Design in Irish Enterprises' identifying six key action areas to enhance the Irish Design Ecosystem. The relatively rapid progression of these activities raises a number of research propositions: In the case of Ireland, what were the preconditions for developing design policy actions? How were the policy actions for design developed? To what extent were they implemented? What, if any, has been the impact and how might this feed into future design strategy development? Based on 14 interviews with a range of stakeholders across the Design Ecosystem, the authors have mapped the significant milestones in the process of developing policy actions for

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design in an attempt to identify the critical success factors for influencing policy. Design is being recognised as a driver of user-centred innovation across Europe (Moultrie & Livesey, 2009, p. 4; Raulik-Murphy, Cawood & Lewis, 2010, p.53; European Commission, 2010, p.3, 2013, p.4; Whicher, 2017, p.117). Among European Union Member States, between 2012 and the summer of 2017, design policies, strategies or action plans have been launched by Denmark, Estonia, Finland, France, Ireland, Latvia and the European Commission (Whicher, 2017, p.117). Mapping the journey towards an Irish Design Strategy might provide insight for other researchers, policy-makers and stakeholders seeking to influence design policy. Based on the case of Ireland, the critical success factors within the process of developing the design policy could be considered a rationale instigated by business champions, evidence to justify government action for design and continued momentum sustained by Design and Craft Council of Ireland.

2. Design Policy: Theory versus Practice

Although a growing number of governments across Europe, including the European Commission (2010, p.3, 2013, p.4;), are recognising design as a factor for innovation, there is no blueprint for developing, implementing and evaluating design policy. In fact, there is a lack of academic evidence and knowledge on design policy, design strategy and design action plans (Choi, 2009, p.4; Raulik-Murphy et al. 2010, p. 53; Cruickshank, 2010, p. 23; Whicher & Walters, 2017, p. 116). The domain of design policy would appear to be one where practice is developing more rapidly than theory. The design policies for Denmark, Estonia, Finland, France, Ireland and Latvia adopted a broad definition of design that can be applied to developing user-friendly products, services in both the private and public sectors and for addressing societal challenges and policy processes (Whicher, 2017, p. 118). Design being recognised on these various levels is broadly consistent with the definition of design proposed by Buchanan (1998, p. 64):

1. Designing symbols, visuals, logos;
2. Designing physical objects, artefacts, products;
3. Designing interactions, experiences, processes, services;
4. Designing systems, strategy.

The notion that design can be enacted at various levels has been reinforced and reinterpreted by practitioners including through the Danish Design Centre's Design Maturity Ladder, which categorises use of design according to four levels: 1) no design, 2) design as styling, 3) design as process, and 4) design as strategy (Ramlau & Melander, 2004, p. 49). The Design Ladder has become a reference point around the world for communicating how design has greater returns depending on how strategically it is used. This has even been echoed by the European Commission in its Design Action Plan:

> *Design is increasingly recognised as a key discipline and activity to bring ideas to the market, transforming them into user-friendly and appealing products or services. Though still often associated solely with aesthetics, the application of design is much broader. (European Commission, 2013, p.4)*

Design can be a complicated notion to convey to government (Whicher, 2017, p. 123). Nesta (2017) has developed an infographic building on Buchanan's definition to communicate design's various roles to government:

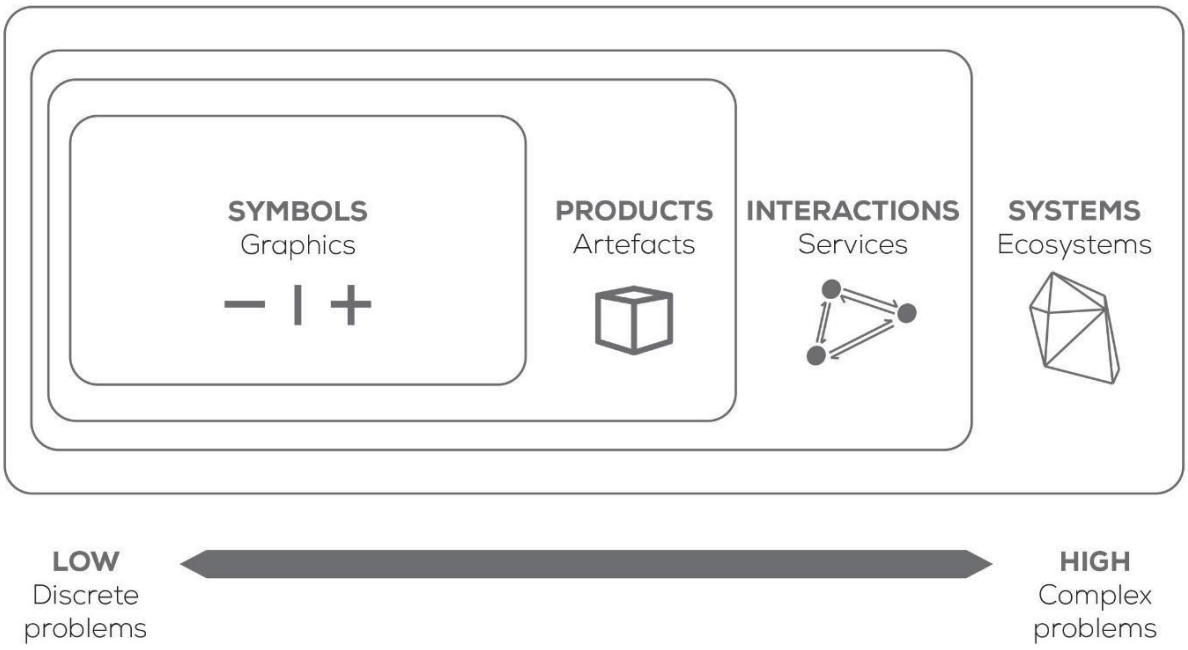

Figure 1 What do we mean by design? source: Nesta, 2017

Having discussed how design is attracting the attention of government and how design might be communicated to government, it is necessary to turn to exploring definitions of design policy. According to Raulik-Murphy:

> *Design policies are government strategies that aim to develop national design resources and to encourage their effective use in the country. A common theme with these strategies is creating an environment in which design and creativity can flourish. (2010, p. 54)*

For the EU project consortium 'Design in European Policies' (DeEP, 2015, p.16) design policy is defined as 'a set of rules, activities, and processes to support design through the reinforcement of design capabilities at all levels of the policy cycle'. Research on design policy is emergent; however, already it has become commonly accepted to draw on the established field of innovation policy to justify design policy. A number of researchers contend that in the same way that innovation policy is based on insight into the innovation system, or more recently innovation ecosystem, design policy should be based on insights from the design system or ecosystem (Love, 2007, p. 3; Moultrie & Livesey, 2009, p. 16; Raulik-Murphy et al., 2010, p. 57; Sun, 2010, p. 74; Swann, 2010, p. 4; Hobday, Boddington & Grantham, 2012, p. 277; DeEP., 2015, p. 11; DJEI, 2016, p. 4; Whicher, 2016, p. 67; Whicher and Walters, 2017, p. 9). To a greater or lesser extent the design policies for Denmark, Estonia, Finland, France, Ireland and Latvia are all based on an assessment of their design ecosystem. The Finnish Ministry of Economy developed a design strategy with 29 actions in which:

> *A well-functioning design ecosystem plays a crucial role in the implementation of the programme vision. The term refers to a complex system where factors affecting the utilisation of design – education, research, design promotion organisations, companies offering design services, public sector incentives and demand for design from businesses and the public sector – operate in close interaction and strengthen one another. (TEM, 2013, pp. 20-21)*

Similarly, for the Latvian Ministry of Culture as stated in the Latvian Design Strategy (2017, p. 8), the Design Ecosystem model 'focuses on the analysis of the local situation and design processes' and that the roles within the design ecosystem 'may overlap and change'. A design ecosystem is 'a theoretical construct used by academics and policy-makers to examine the interplay between actors and initiatives in a network and how this can inform targeted policy action for design' (Whicher,

2016, p. 82). And thus, design policy can be considered 'government intervention aimed at stimulating the supply of and demand for design to tackle failures in the way that actors and components interact in the ecosystem' (Whicher, 2016, p.82). A model for conceptualising a Design Ecosystem (Whicher, 2016 - see figure 2) has been developed and tested through a combination of research and knowledge transfer initiatives and also been embraced by the Latvian Ministry of Culture as a framework for developing the Latvian Design Strategy. The model hinges on the premise that all components of the Design Ecosystem are interdependent and that there should be a balance between supply and demand in order to create a dynamic ecosystem.

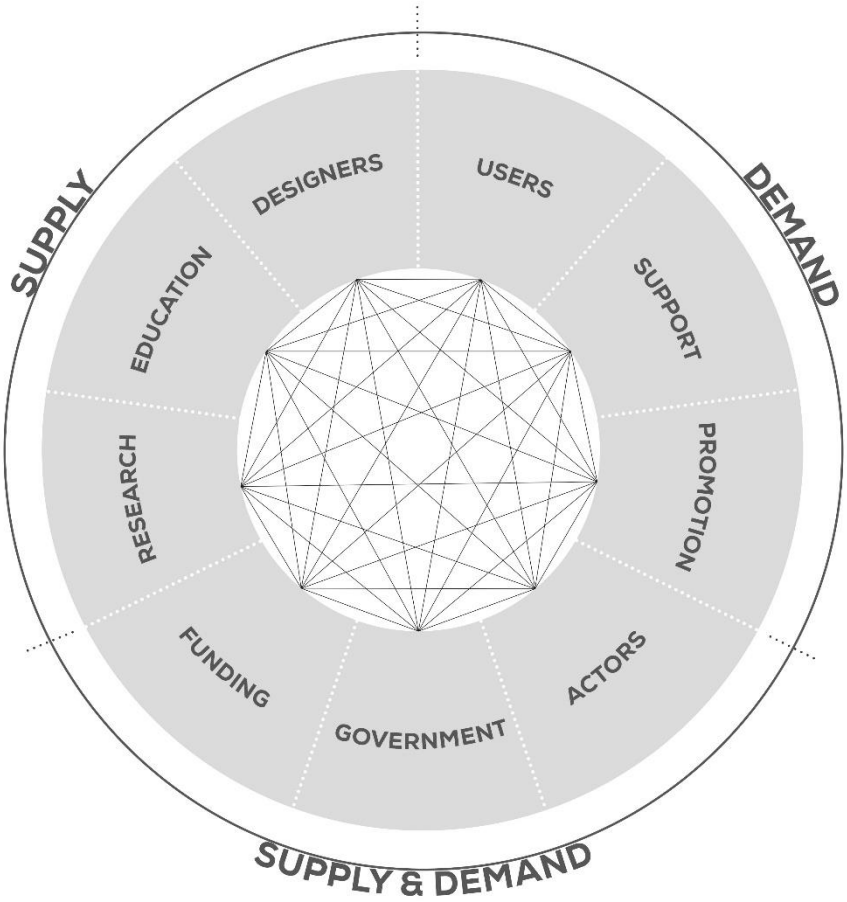

Figure 2 Design Ecosystem. Source: Whicher, 2016

3. Method

The Design Ecosystem model has been taken as an overarching framework for identifying and selecting participants for examining the process of developing design policy actions for Ireland. A series of 14 participants were interviewed representing a cross-section of the Irish Design Ecosystem (see table 1 for the breakdown of interviewees per category of the Design Ecosystem). Each of the interviewees played an active role in the process of developing the Policy Framework for Design in Irish Enterprises and as such were well placed to inform the mapping of the design policy process for Ireland. For example, DJEI established an Advisory Group to guide the development of the Policy Framework for Design and these people were involved in the research, among others. At least one interviewee was selected to represent each of the nine segments of the Design Ecosystem model. The 'government' segment of the Design Ecosystem was covered by three policy-makers from DJEI with direct responsible for the policy formulation process including chairing the Advisory Group, commissioning new research and drafting the Policy Framework for Design. The components 'design support' and 'funding' were accounted for by the two representatives on the Advisory Group from Enterprise Ireland, the national innovation agency. The elements 'design promotion' and 'actors'

were covered by the Design and Crafts Council of Ireland as well as the Year of Irish Design 2015 (ID2015). The segment 'design users' included interviews with senior managers in a small, a medium and a multi-national company. These companies were selected by Enterprise Ireland as 'innovation leaders' and case studies of Irish firms successfully using design as part of an evidence gathering process. The components 'design education' and 'research' involved academics from Dublin Institute of Technology and the National College of Art and Design both consultants in the policy process. Finally, the representing section 'designers' were two freelance designers who contributed to the policy process by performing research and insights activities for DJEI.

Table 1 Interviewee categories..

	Stakeholder category					
Design Ecosystem element	Government	Support & Funding	Promotion & Actors	Education & Research	Designers	Users
Organisation name	Department for Jobs, Enterprise & Innovation (DJEI)	Enterprise Ireland	Design & Craft Council of Ireland	Dublin Institute of Technology & National College of Art & Design	Freelance designers	A small, a medium & a multi-national enterprise
Number of interviewees	3	2	2	2	2	3
Total						**14**

The interviews were conducted face-to-face in Dublin between July 2015 and July 2017 lasting between 60 and 90 minutes. The questions were semi-structured, allowing flexibility for the interviewee, and focused broadly on the preconditions for developing design policy actions, how the policy actions for design developed, to what extent they were implemented, whether they had impact and what the critical success factors might have been in the case of Ireland for getting design on the policy agenda. Based on the interview data, a number of iterations of the Map of the Irish Design Policy Process were produced and feedback was provided by telephone by two key stakeholders. These stakeholders were selected to validate the mapping exercise based on their institutional commitment to advancing the design policy agenda in Ireland. As new design policy developments emerge the map will be updated. Mapping the process by which the policy actions for design were developed by the Irish Government is the first step to performing a comparison with the design policy development processes in other European countries to potentially move towards codifying a model for a Design Policy Development Process.

4. Findings

This section plots the route (see figure 3) along which DJEI progressed resulting in the Policy Framework for Design in Irish Enterprises. These are the key milestones and initiatives on the journey towards a National Design Strategy which is still in development.

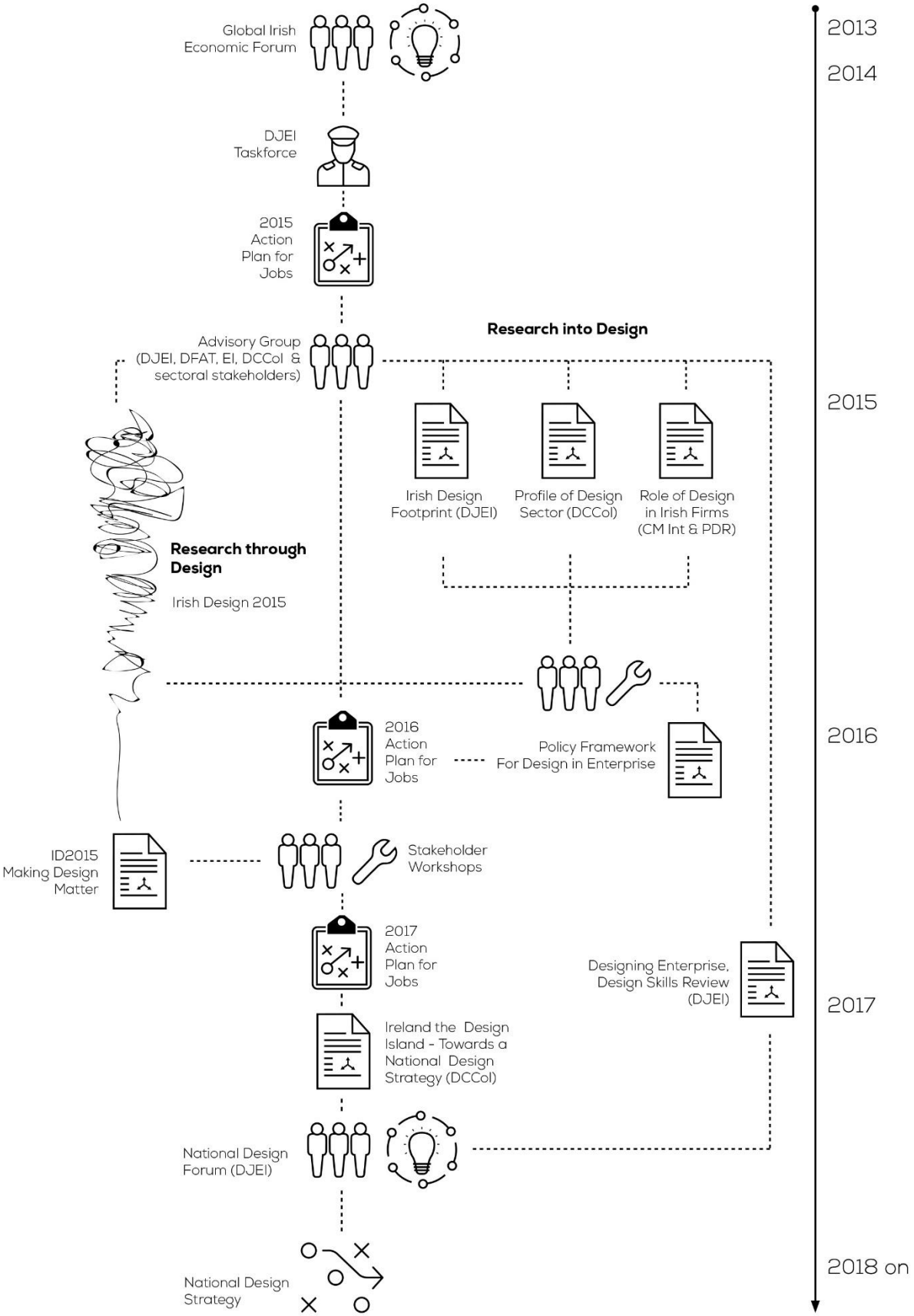

Figure 3: Journey Towards an Irish Design Strategy

4.1 Planning the Route to an Irish Design Strategy

Arguably, the journey towards a national design strategy started in the 1960s, with the so-called Scandinavian report - Design in Ireland (Scandinavian Design Group in Ireland, 1961); the first significant move towards understanding design in a national context. This seminal report provided a catalyst for change in the Irish State's approach to design. The Report was commissioned by Córas Tráchtála, the Irish Export Board and the Scandinavian Design Group was formed expressly for the purpose of writing the report. As well as stimulating debate, and laying the foundation for significant changes in design education in Ireland, the Scandinavian Report also provided a clear rationale for establishing the state-funded Kilkenny Design Workshops responsible for building capacity design among Irish industry and wider society. Since then, as described by one academic interviewee, discussions revolving around design policy have been "cyclic" re-surfacing "approximately every decade". However, all interviewees concurred that the developments gathered significant momentum after 2013 when at the Global Irish Economic Forum business and cultural leaders called for design to be recognised as a national approach to innovation. This was a "turning point" giving "fresh impetus" to the design policy process in Ireland and therefore has been included as the first milestone. One interviewee described the annual forum as a "crowdsourcing ideas for policy". Consequently, a task force was assembled in DJEI to examine the role of design in innovation. As a result, in the Action Plan for Jobs 2015 DJEI outlined six "specific and ambitious targets":

- Create 1,800 new jobs in design by 2019
- Establish 200 design-led business start-ups in 2015
- Generate €10 million in design exports in 2015
- Facilitate 300 company visits on international design-based trade missions
- Implement two Design 'Accelerators' to fast track new design companies by 2016
- Engage with 3 million at home and abroad (DJEI, 2015)

Working towards these targets, DJEI designated 2015 the Year of Irish Design (ID2015) with the President of Ireland as its patron. DJEI invested €5 million in ID2015, which was also matched to the same value by industry sponsors. This represented the "largest single government investment in design ever" in Ireland. What makes ID2015 and the Action Plan for Jobs 2015 atypical of design initiatives in Europe is, according to DJEI, the significant "resources mobilised" and, according to one designer interviewed, the "stringent metrics." To monitor ID2015 and the targets, DJEI set-up an expert Steering Group was with 8 representatives from national bodies for innovation and design such as Enterprise Ireland and the Design and Crafts Council of Ireland, among others. The role of the Steering Group was, according to the Action Plan for Jobs, to examine the impact of design with a view to devising a 'strategy to ensure longer-term development of the design sector and business investment in design as part of the legacy of ID2015' (DJEI, 2015, p. 133).

4.2 Signposting the Way

Guided by the Steering Group, DJEI embarked on an evidence gathering mission including commissioning three research studies on 1) the understanding of design in Irish firms, 2) the composition of the design sector and 3) the contribution of design to the economy. For DJEI, the purpose of the three studies - Design in Irish Firms, Profile of the Design Sector, Irish Design Footprint – was to "establish three crucial data benchmarks". The study on the 'Role of Design in Irish Firms' (Henderson & Whicher, 2015) involved a literature review of design-driven innovation, case studies of 12 Irish firms successfully using design and a survey among n216 innovative Irish firms key account managed by Enterprise Ireland. The survey findings (see figure 3) revealed that among the cohort, 97% believe that design is key for customer satisfaction, 90% of respondents perceived design as a driver of innovation and 86% considered that design is key to Ireland's business reputation. According to a design manager in a multi-national financial firm: "Ten years ago

design was seen as production and styling and now the concept of design thinking has become a strategic part of business to add more value and invest in KPIs."

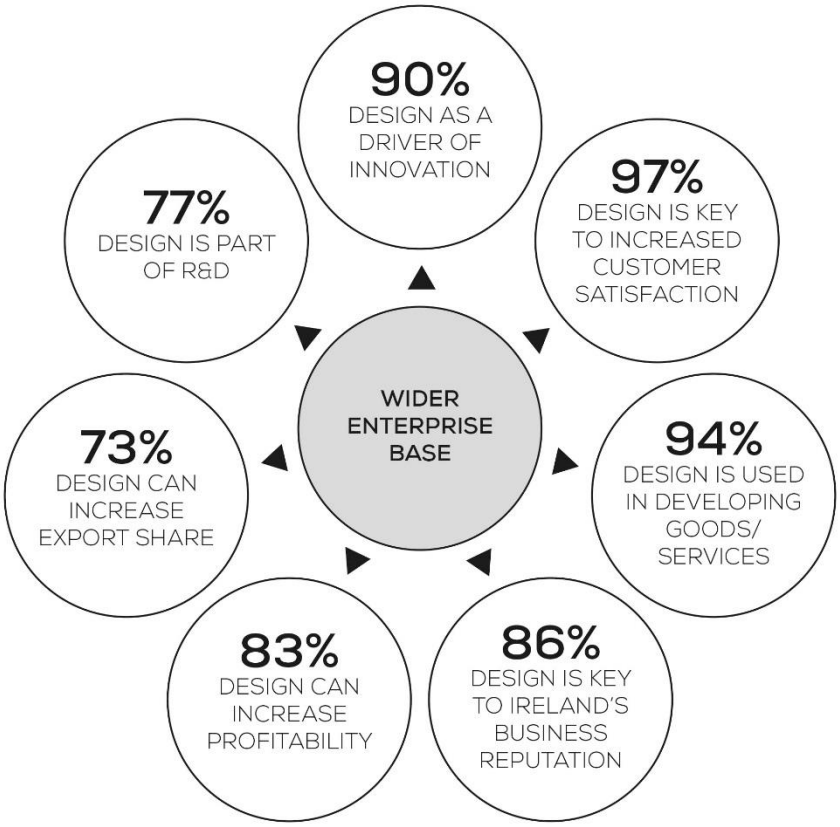

Figure 4 Design in Irish Enterprises. Source: DJEI, 2017

The study 'Irish Design Footprint: Economic Value and Characteristics' was performed by DJEI to create estimates of the economic value of design across the entire Irish economy based on data from industry codes extracted from the business register collected by the Central Statistics Office. Broadly, the study replicated the 'Design Economy' study commissioned by the UK Design Council. The definition of design was proposed by DJEI and encompassed specialised design (including graphic, industrial, interior, fashion), architecture, digital, design engineering, creative directors and craft. The findings revealed that design has a significant influence on the Irish economy. At around €38 billion in 2013, exports from the design sectors account for more than 21% of total exports (mostly due to the strength of the digital sector). Employment in design roles has increased by 6.7% between 2011 and 2014 to 48,000 people; this constitutes 2.5% of total employment in Ireland. The study on the 'Profile of Business in the Traditional Design Sectors' (Kennedy, 2016) was based on desk research and interviews with sector representatives. The research revealed a strong regional spread of design agencies. At the end of 2016, the study found 3,868 design businesses in Ireland with the greatest concentration in the Dublin region (1,329 design businesses) and the second largest concentration in Cork (408 design businesses). Nevertheless, the study also suggested fragmentation in the sector due to small business sizes and relatively short lifespan of design businesses. There was a strong start-up culture with two thirds of design businesses being less than ten years old and the majority being small and micro businesses. For DJEI, to advance the design policy agenda the "most convincing arguments were economic". The three studies are demonstrative of the type of evidence required by government to intervene in the Design Ecosystem.

4.3 Taking the First Steps on the Journey

The economic data on design was vital for advancing the design policy agenda; however, according to one policy-maker, "there was both a formal and an informal approach to policy development influenced by our involved in ID2015". One academic described this as "immersive policy-making" while another compared the traditional linear process against a "spaghetti" process. This was in effect research into design through design. DJEI embarked on a significant "data and insights synthesising" process to define the policy options. Consequently, to capitalise on ID2015, in January 2016, the Policy Framework for Design was launched focused on six areas:

- Increased use of design-driven innovation in the wider enterprise base
- Building scale in the design sector
- A step-up in the engineering design sector
- Supporting entrepreneurship in the design sectors
- Developing skills and talent in design
- More females in design roles. (DJEI, 2017)

From the perspective of one of the designers, whereas the Action Plan for Jobs 2015 had been "prescriptive" the Policy Framework for Design "did not go as far". The former allocated a specific empirical target, assigned a timeframe and a delivery body; whereas the latter was a vision for design not linked to specific funding mechanisms, targets or implementation plan. A similar sentiment was expressed by a representative from a medium-sized company in the advanced engineering sector: "The design policy is important for progressing the dialogue in government. However, more needs to be done because in businesses the accountants may not see the value of design they would only see the price tag." Nevertheless, the design policy was fervently supported by the then Minister for Business and Employment, Ged Nash T.D. (Design for Europe, 2016), it was his vision to:

> *engage with Ministers, Departments and agencies, and others in the Government sector to better embed design in various aspects of national policy – education, culture, tourism, foreign diplomacy – but most importantly enterprise and innovation, as a force for job creation, international competitiveness and foreign investment.*

Winning political commitment to design is a significant step as the ebbs and flows of the political tides affect agenda setting. Not only did the Government develop a dedicated design policy but design was also integrated into the enterprise policy, innovation policy and Action Plan for Jobs 2016 and 2017. This has been an immersive process for many of the stakeholders involved including Enterprise Ireland: "We are moving from design with a small 'd' to Design with a big 'D'. That is moving from passive support to actively supporting companies to use Design." This immersive element of the policy process is intangible but nevertheless a vital and perhaps underestimated part of policy-making.

4.4 Taking Stock of the Journey So Far

The Year of Irish Design (ID2015) was a programme of national and international events and initiatives "on a scale never before attempted in Ireland" according to the Design and Craft Council of Ireland, the main implementation body. Aiming for the establishment of a "sustainable Irish Design Ecosystem" meant the development, implementation and evaluation of an array of programme components:

- Design Support - providing design thinking and training for industry and the public sector.
- Design Sector - raising the capabilities of Irish designers and establishing the critical network, infrastructure, information and research required to support the development and culture of the Irish design sector.
- Design Promotion - creating a greater appreciation and demand for design.

- Design Research - commercialising research through design-led innovation and new intellectual property creation.
- Design Education - providing design thinking and training for pupils, students and lifelong learners.
- Design Policy - providing the contextual framework, critical to decision making in the development and promotion of design through policies and strategies.

The focus was both broad through a large-scale showcasing of Irish design around the world in Embassies, exhibitions and tradeshows; as well as at home, where, for example, the Competitive Start Fund, run by Enterprise Ireland, provided €50,000 to seven start-ups. According to Enterprise Ireland, the Minister has "commissioned a mapping of all of the innovation programmes […] to identify where design can be integrated".

Some design policies or action plans in Europe have come under criticism for being retrospective not forward-facing documents (Whicher, 2017). For example, the EU Design Action Plan could be considered a stock-taking of design actions occurring between 2012 and 2017, even though the document was published in 2013. The EU Action Plan did not leverage any additional funding for design actions, although it should be noted that between 2012 and 2017 the EU allocated €25 million for design initiatives (BEDA, 2017). What makes the case of Ireland unique is that by setting "stringent metrics" in the Action Plan for Jobs 2015, the impact of ID2015 could be evaluated in order to assess whether additional actions could be justified in future years to drive Irish competitiveness. The Design and Craft Council of Ireland (DCCoI) performed an evaluation of the activities and impact of ID2015 according to the targets set in the Action Plan for Jobs 2015 (see table 2). Not only did ID2015 achieve or exceed all its targets, in interview DCCoI reported that "the return on investment in the initiative was over tenfold".

Table 2 Impact evaluation from ID2015. Source: Interview with DCCoI and also in Milton et al., 2017.

Target in the Action Plan for Jobs 2015	**Impact from ID2015 by January 2016**
1,800 new jobs in design created by 2019.	4,000 new jobs in design created.
200 design-led business start-ups established in 2015.	370 new design businesses registered in Ireland.
€10 million in design exports generated in 2015.	€24.1 million in design-related export sales.
€10 million generated in PR value	€22.1 million of PR value generated.
300 company visits on international design-based trade missions in 2015.	476 Irish companies showcased internationally.
2 Design 'Accelerators' implemented to fast track new design companies by 2016.	2 design support programmes implemented.
3 million at home and abroad engaged in ID2015 activities.	28.5 million people engaged at home and abroad in 670 projects including 100 internationally.

By demonstrating the ID2015 exceeded the targets established in the Design Action Plan 2015 there was political impetus to continue the successful trajectory. As such, part of the legacy of the year has been the development of a National Design Innovation Centre and the drafting of the consultation paper towards a National Design Strategy 'Ireland – The Design Island' by DCCoI. Speaking at the launch of the paper in January 2017, Minister Mary Mitchell O'Connor T.D. (DCCoI, 2017) announced that:

> *It is important that we build on the momentum and achievements of ID2015 in order to develop opportunities for growth, especially in relation to exports. I am very pleased to see that a wide range of education and industry representatives have been involved in this consultation. The resulting document contains a list of issues that need to be examined, from quick wins to long-term strategic goals. This will now inform my department's plans for developing Ireland's design capability and for encouraging*

design thinking across all sectors. Design will be a specific component of the Action Plan for Jobs process in 2017, both at national and regional levels.

Some of the more progressive proposals in the consultation paper included expanding Ireland's design skills base, from primary level education upwards, increasing the use of design-driven innovation in Irish businesses in key growth sectors, building capacity for design in public bodies and encouraging the use of design in public procurement (DCCoI, 2017), among others. The Minister also announced the establishment of the National Design Forum which would comprise of representatives from key sectoral stakeholders, and be chaired by the Minister for Jobs, Enterprise and Innovation. This in effect constitutes the next stage on the journey towards a national design strategy for Ireland.

5. Discussion

Mapping the process by which the policy actions for design were developed by the Irish Government is the first step to performing a comparison with the design policy development processes in other European countries to potentially codify a model for a Design Policy Development Process. Mapping the milestones on the journey so far to towards a national design strategy is only part of the approach, it is important to analyse those milestones to identify the critical success factors that led to the significant decisions including ID2015, the Policy Framework for Design and the continued support in the form of the development of a National Design Innovation Centre and consultation paper. Among others, three factors were consistency cited by interviews as critical for the development of the design policy and beyond. The critical success factors were considered a rationale instigated by business champions, evidence to justify government action for design and continued momentum sustained by Design and Craft Council of Ireland. Although attempts had been made in the past to ignite interest in and create critical mass for a design policy, it was only when business and cultural leaders at the Global Irish Economic Forum in 2013 championed design that the process really started in earnest. According to an interview with a senior academic, none of the previous activities had the "political clout that the collective influence of certain high profile Irish business leaders are able to exert on government". This sentiment was echoed by other interviewees:

The annual Global Economic Forum feeds into all elements of government. It's like crowdsourcing ideas for policy from cultural and business leaders.

What might be concluded from the case in Ireland is that in order to get design on the innovation policy agenda, it is necessary to have champions and ideally high-profile advocates from industry.

However, the agenda-setting by the business and cultural leaders is not sufficient for informing policy. Policy should be evidence-based and if research did not demonstrate the link between design and innovation and competitiveness there may not have been a Policy Framework for Design. Interviewees, including notably the three DJEI policy-makers, all identified evidence as a critical factor for advancing the design policy debate. Evidence played a crucial role twice during the process the findings from the three research studies commissioned by DJEI as well as the results of the evaluation by DCCoI of ID2015. In mid-2015, DJEI commissioned three research studies on the understanding of design in Irish firms, the composition of the design sector and the contribution of design to the economy. For DJEI, the purpose of the three studies - Design in Irish Firms, Profile of the Design Sector, Irish Design Footprint – was to "establish three crucial data benchmarks". The studies revealed that design is perceived as a competitive advantage by innovative Irish firms and that design makes a substantial contribution to the Irish economy (predominantly through the digital sector). Based on survey responses among a cohort of n216 companies key account managed by Enterprise Ireland 97% consider design as key to increased customer satisfaction and 94% consider design effect for developing goods and services (Henderson and Whicher, 2015). Similarly, the Irish Design Footprint research based on industry codes revealed that exports from the design-related sectors account for more than 21% of total exports and that employment in design roles has

increased by 6.7% in 3 years and constitutes 2.5% of total employment in Ireland (DJEI, 2016). The research on the Profile of the Design Sector revealed a strong regional spread but also a number of weaknesses in the sector such as fragmentation, small business sizes and relatively short lifespan of design businesses. For DJEI, to advance the design policy agenda the "the evidence from the research supported the need for a policy framework." The three studies are demonstrative of the type of evidence required by government to intervene in the Design Ecosystem.

Although there are a number of design policies, action plans and strategies across Europe the impact evaluations, if performed, have not been made public. The evaluation of ID2015 against the original targets was a vital part of the evidence based. When framed within the Action Plan for Jobs 2015, the list of quantitative targets appears very ambitions, particularly the measures such as '1,800 new jobs in design created by 2019', '200 design-led business start-ups established in 2015' and '€10 million generated in PR value'. However it is testament to the scale and reach of ID2015 that all targets were met or exceeded. In fact, by January 2016, according to DCCoI '4,000 new jobs had been created in design'. ID2015 had achieved more than double its targets in design-related export sales (€24.1 million) and the same for the PR value generated (€22.1 million) (Milton, Hennessy & Donnelly, 2017). Allocating such clearly defined targets is unusual for a design policy and as such, it is perhaps a slightly missed opportunity that a new set of targets was not developed as part of the Policy Framework for Design. Therefore, the lesson in the Irish case is to develop a small number of empirical metrics with timeframes and allocated to specific delivery bodies in order to then evaluate whether the design policy has been successful and had impact. Of course, there are wider more systemic impacts beyond the empirical but ultimately policy-makers are looking for metrics such as job creation and economic contribution. Such data will provide an on-going justification for government intervention for design.

As previously stated, efforts towards a national design strategy have been "cyclic" and according to one interviewee the "real challenge is to sustain momentum" after the intense year-long campaign. For to DJEI, Enterprise Ireland and DCCoI the continued support for design is due to the ongoing visibility and engagement efforts of DCCoI. According to DCCoI, "ID2015 was a catalyst for other activities like Enterprise Ireland taking more of lead on the design agenda." Indeed, Enterprise Ireland recognised the need to "bring our own organisation on the design journey". Similar sentiments were echoed by DJEI: "It has been a learning curve for DJEI and we have started to use design thinking in our policy work." In essence, it is not only the tangible results of ID2015 that have had an effect but the immersive experience exposing decision-makers to design processes that they would not usually have been involved with. This is in effect policy for design through design. The Design and Craft Council of Ireland (DCCoI) has been able to capitalise on the success of the year and set a number of ambitious activities for the coming years including establishing a National Design Innovation Centre. DCCoI has been mandated by DJEI to lead on the consultation process towards a national design strategy: "Now we want to perform a more in-depth mapping of the Design Ecosystem in Ireland." Clearly there are multiple factors at work in advancing the design policy agenda but the critical points appear to be business leaders setting the agenda, evidence driving policy development and sustained advocacy by a national design body.

6. Conclusion

The comprehensive programme of events and capacity building activities for ID2015 played an instrumental role in positioning design at the heart of Ireland's creative economy and in growing Ireland's reputation abroad as a home for innovative design products and services. The reaction to the work of Irish designers at key international design weeks, architectural biennales and fashion weeks highlighted the success of ID2015 in promoting the breadth of Ireland's design talent on the world stage. Minister Nash (Design for Europe, 2016), when reflecting upon the year stated that

> *ID2015 confirms that design creativity is alive and well in Ireland both at the individual and the business level. But it also tells us that investing in our design capability and*

performance will yield new export sales, create quality jobs and boost Ireland's international creative brand. To do so, Government will work with the DCCoI and the design sector to bring design into the heart of enterprise policy and to lose its status as the Cinderella of Ireland's innovation strategy and action plans. We need to build on the legacy of ID2015 and these actions will maintain the momentum created by the year of Irish Design. I believe there is huge potential to grow both employment and exports in businesses that embrace design as a core function of their enterprise. We also have the opportunity to further cement Ireland's reputation as a source of quality design.

The Irish government's on-going commitment to pursuing concrete actions on design has been reflected in the Action Plan for Jobs 2016 and 2017, with a significant number of design-focused actions helping maintain the momentum of ID2015 including:

- The establishment of the National Design Forum, led by DJEI and including key stakeholders from the private and public sectors.
- Strengthening Ireland's design capability and performance through Enterprise Ireland and DCCoI supports such as Regional Collaboration Funds, Start-Up Funds, International Trade Promotion, Clustering initiatives, Technology Gateways, Incubator initiatives and regional and sectoral networks.
- Exploiting opportunities for Ireland to win EU design collaboration funding.
- Expanding the 'Design 4 Growth' Initiative launched as part of ID2015 and led by Dublin City Local Enterprise Office, bringing small firms and designers together.
- Continued promotion of Irish design through our Embassies abroad and through Enterprise Ireland's export promotion activity.
- Enterprise Ireland working with DCCoI in promoting design thinking to their clients as a strategic element of business management.
- The Government's Future Skills Group looking at current provision of design skills and scoping out future skills needs.

Irish Design has witnessed a series of tectonic shifts in the decades since the 1961 Scandinavian Report. ID2015 and its legacy of collaboration and participation across sectors has helped build the platform for the creation of formal and informal design strategies that can help support design-led innovation, and map Ireland's evolving design landscape. There are without a doubt a number of lessons for other stakeholders seeking to influence design policy, notably, support from business champions, economic evidence to justify government action for design and continued momentum sustained by key stakeholders, among others.

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Design Insights and Opportunities from a Field Study to Digitally Enhance Microcredit Practices in Brazil

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The use of mobile and social technologies has been recognized as enhancing financial practices by both academics and multilateral agencies. But these are complex matters and their impacts are not always straightforward. Although much has been written about microcredit, more understandings of such practices are still needed. In this work, we investigate informal credit practices of merchants in the northeast of Brazil. We observe that the informal credit practices are based on a sense of community and personal relationships between merchants and their customers. In learning how community norms are used to support (and sanction) credit practices, we aim at better understanding how to design new financial products and services. We explore insights for this context gathered from fieldwork, discuss research challenges, and show a design concept of a service that aims to digitally enhance microcredit practices.

microfinance; design research; field research; low-income communities; banking

1 Introduction

We describe in this paper the results of a study aimed to understand financial practices of small business owners (SBO) who were microcredit customers of a microfinance institution. The goal of the study was to inform the design process of apps aimed to simplify and improve the process. By unveiling financial practices during the field work activities, we found several design opportunities to digitally enhance microcredit practices for the SBO.

To understand financial practices and the context of poor neighbourhoods it is essential to go to the field to understand their reality. It is fundamental to extensively use qualitative techniques such as interviews and bring back the "voice" of the users and clear examples of their lives, since their reality is often extremely distant of the everyday life of developing teams. This paper extensively reports on those types of findings to support and nurture the design efforts of other teams working on money-related technology for the poor.

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Also, financial information is regarded as private and sensitive in almost any culture and social class Therefore, the design process should use techniques to talk about sensitive and private subjects so participants do not feel uncomfortable (Dickson-Swift et. Al., 2007). Several issues might appear during the field study that might disrupt participants' attention and change the course of the study planning. In this paper, we also present several techniques we used to facilitate the conversation and to accommodate privacy concerns related to money.

The result of the study, reported here, consist of a dozen design opportunities and insights which served as a base for a multidisciplinary project team to design new technologies for those communities. As an example, we show a new financial application for SBOs which materializes some of our findings with a design scenario and prototype description.

2 Understanding Financial Practices

There has been considerable recent interest in understanding the financial practices of people in a variety of contexts. For example, Kaye et al. (2014) investigated how people monitor and manage their financial resources, and they found great variation across individuals and families, and documented rich practices using both paper and digital systems. Vines et al. (2014) investigated the financial practices of lower income citizens in the UK, and found multiple uses and nuanced meanings in the way payments are made. Pritchard et al. (2015) provided a very detailed study of digital payments on the London bus system. In all three of these recent studies, the focus was on understanding financial practices to inform the design of new financial services in economically advanced countries.

At the same time, there has been greater interest in the use of information technology to provide new financial services in less economically advanced countries. Much of this interest has been focused on microfinance and there has been much work within the area to understand the work practices and policies found in the organizations that deliver microfinance services. These include a variety of organizations, including banks, government agencies, and SBO and entrepreneurs. Plogmann et al. (2010) investigated a Microfinance Institution (MFI), the Grameen Bank in Bangladesh, to understand the role of technology in microfinance performance. They found widely varied and often very limited information and communication technology (ICT) deployment within MFIs and more essential, an important focus on the creation of trust and social capital between and among the bank workers and clients. In a second study with the Khushhali Bank in Pakistan, Adeel et al. (2010) investigated the detailed work practices of the "business development officer", more specifically, as new communities are identified and new clients/borrowers are approved for loans. The research team identified several opportunities where ICT could be used to support operations (e.g., application and account administration), although cost and limited appropriation of the technology remain challenging.

In this paper, we present the results of a study of financial work practices of SBO in North eastern Brazil. We are interested in understanding how SBO work together as a community to create financial stability and economic growth and how they create social capital and trust within the community. And finally, we are interested in the design implications and opportunities for future financial services.

3 The Social Importance of Credit

Access to credit is important for both SBO and their customers for a variety of reasons. For SBO, credit allows management of cash flow and expansion of their business, by financing capital investments and advanced purchase of inventory. For individuals, credit can help finance housing purchases (land and home), health and medical expenses and emergencies, education, and significant life events (Adeel et al.,2010). For both business owners and individuals credit can help with income fluctuations and cash liquidity

There is a distinction between formal and informal credit (Brusky & Fortuna 2002). Formal credit typically involves a bank or microfinance institution, and can be found as either a lump-sum credit (e.g., bank loan, cash advance on a credit card, or a microcredit loan from a MFI), or as instalment credit (e.g., credit cards, payment plans from retail merchandisers where the purchase price is repaid with a fixed amount over a fixed number of periods). In our research, we examine closely the informal practices. Informal credit is more common among the low-income populations and consists of lump-sum loans from family and friends, or store credit in the form of informal store credit (known as fiado in Brazil).

4 Microfinance programs

The development of microfinance and microcredit has been much studied, particularly in Bangladesh where the practices were initially developed by the Grameen Bank. Reviews of this research indicate that while there are similarities across different cultures and countries, often local modifications are required for a microfinance program to be successful. Early summaries by Brau and Woller (2004) and Ledgerwood (1998) focus on institutional practices for microfinance, while a more recent "handbook" concentrates on the financial needs of the clients served and the benefits and barriers of "financial inclusion" (2013).

As important context for the research presented here, we first provide some background on microfinance as can be found in MFIs and communities within Brazil. One formal distinction made in Brazil is between "productive" microcredit and "assisted productive microcredit." The former involved small loans to low-income population to help with productive (small business) activities. Assisted productive microcredit is "based on the personal relationship between the microcredit institution and the entrepreneur through credit agents" (Silva and Gois 2007). The credit agents provide personalization of services through visits to the small businesses, gathering financial information about the borrower's household and business income to provide a credit analyses. This on-site community interaction between the agents and the borrowers helps the bank better assess the risk of the loans (Silva & Gois 2007).

Another core aspects of microfinance in Brazil includes the use of "solidarity groups" to guarantee the separate loans of the group members. These small groups (3-7 members) are typically comprised of people who know and trust each other. The peer-pressure to make debt payments results in an "efficient credit assurance mechanism" (Giné & Karlan 2014).

5 Methodology

This study took a Design Research perspective, which consisted of more than a set of strategies and procedures to understand micro credit practices. It integrated ideas and insights from the outside world into our design process (Laurel 2003; Zimmerman et al. 2007). Our design process was supported by fieldwork findings that generated insights into new financial technologies for SBO. Between fieldwork and the materialization of the design concepts into prototypes, several design workshops with the multidisciplinary project team (developers, designers, computer scientists, social scientists) were held. The team iterated, using design techniques, envisioning scenarios and storyboards to create mock-ups and interface design screens for new financial technologies (e.g mobile apps) (Sandberg 2012; Brown & Wyatt 2015). In the current paper, we describe insights and design opportunities gathered from our field research. Moreover, we illustrate the results of applying those insights into a concept scenario with a financial mobile service for SBO.

6 Field research

Our understanding of the social and cultural practices of informal credit was informed by interviews, work observations, and analysis of the documentation about the microfinance program that is publically available. We conducted 20 semi-structured interviews and work observations in two

cities in the Northeast of Brazil. The first city was Fortaleza a capital city and an urban environment. The second city was Icapuí, located in the semi-arid region in the Northeast seafront.

We interviewed 12 SBO and 8 credit agents from the MFI. All the interviews took place at the local business establishments in September 2014. The semi-structured interviews took approximately 90 minutes and were audio recorded for future transcription. Two researchers were present for each of the interviews, one to conduct the interview and the other to take notes. Those roles were interchangeable. It was the responsibility of the note taker to record detailed, unbiased, and concrete observations. The interviewer also took notes depending on the pace of the interview sessions. A local bank agent from the MFI was also present for each of the interviews. Each of the participants signed a consent form that explained the motivation and protocol for the study and asking for permission to take pictures and to audio record the interview. At the beginning of each interview, the researcher "broke the ice" by holding up a small mirror and asking the participant: "Who is this person here, in the mirror?" Participants usually smiled and answered with demographic information. With this informal atmosphere, we then proceeded with the semi-structured interview. (Figure 1).

For the SBO we asked questions about their financial activity (e.g., about their expense types, how they track them, and generally how they manage cash flow); financial instruments (which tools they use to track income and expenses, how they monitor their bank accounts, and the kinds of technology they use); financial planning (how they think about the financial future and priorities); savings; and payment methods (e.g., credit and debit cards, cash, and/or bank checks).Those categories were inspired by previous research (Chipchase et al. 2014; Kaye et al. 2014; Wulf et al. 2011).

Elements of the physical environment were recorded in the form of photographs and field notes. Work observations were based on SBO's interactions with their customers and MFI agents. It was possible to see the dynamics of the SBO's establishment, as we interviewed them during working hours. We did not have the opportunity to accompany the MFI agents during their daily activities. We interviewed the MFI agents at centralized MFI work locations.

After each day of field study, the field researchers reviewed and reflected on their notes, adding observations where necessary. The two researchers compared notes to discuss and validate their impressions and included discussions about important, expected and surprising observations. Those discussions were valuable to minimize bias in the subsequent data analysis. An exploratory and qualitative approach was undertaken in the data analysis. The data analysis was guided by, but not restricted to, the main issues present in the field notes. The data were coded after transcribing and translating all the semi-structured interviews using NVivo software. Data transformation was applied in order to count the frequency of categories that emerged in the data (Creswell, 2009). Those categories were then used to drive the interpretation and findings presented below.

6.1 Participants

6.1.1 Small Business Owners

All 12 of the business owners who we interviewed were medium and long-term participants in the MFI program. The average value of their loan was around US$ 1,000. They owned a variety of businesses, including small grocery stores, restaurants, and clothing stores. Most the SBOs were female (9 of 12) and the average age was 45 years old. Eight of the SBOs also had a personal loan from the MFI, which is allowed after they have been with the program for a minimum period and if they agree to remain a member of the solidarity group.

Figure 1. Interview with a clothes store owner. Researcher "broke the ice" by holding up a small mirror and asking the participant: "Who is this person here, in the mirror?"

The participants in general have the basic knowledge about technology. All of them own mobile phones and some of them own computers. Only three participants did not use Internet services. Two were social network users; the others know of them, but only their children use them—the most popular services being Facebook and WhatsApp. We visited some places without running water where people owned smartphones and notebooks with Internet connections.

Typically, they have Internet access through their mobile phones. There are a variety of mobile phones operators in Brazil. Even in those two cities (Icapuí and Fortaleza), we found people using two to four SIM cards in their phones to decrease costs. In remote areas, to improve the mobile phone operator's connection, participants connect their phones with a wire to an antenna. Additionally, we found in some neighbourhood's house owners who shared openly their Wi-Fi connections, making their homes a "hotspot" for teenagers to hang out.
We have observed different literacy levels among the participants. This was observed during the study when participants were reading aloud the study consent form and in the interviews. Textual (reading) literacy, financial (numerical) literacy, and computer literacy are all important when designing new financial products or services. Medhi-Thies (2015) has recently provided an excellent review of design issues and possible approaches for low-literacy projects. We considered some those issues when we conceived our design concepts (i.e. dialogue mode; speech, photo button, bar code, etc.).

6.1.2 Credit Agents

We also interviewed 8 credit agents from the MFI. Generally, credit agents are well educated, young, and highly motivated individuals. Five of eight are currently enrolled in university programs. All them have been working for the MFI for more than 2 years.
The credit agent is the primary bank contact within the community. Each agent is responsible for one or two geographic areas and works with about one thousand SBOs. The agents are aware of most of the businesses in their area and maintain good relationships with the microfinance members. Such relationships are not without tensions, and mostly often based on power, respect,

and integrity. They visit about eight SBOs a day and are also available most of the time by phone. The credit agents provide financial education and advice, answer questions, and prospect new microfinance members. Credit agents should build a trusting relationship with their clients and visit them frequently.

7 Findings: Informal credit practices

In this section, we describe SBO use of informal finance services. Our findings generated several insights and design opportunities numbered in the text from 1 to 3.

7.1 Small businesses owners and their customers

Quite naturally, the merchants and their customers form an important social network. Normally the small business is in the same neighbourhood where the merchant and customers live. They meet very often and depending on the business (e.g., groceries) the customers may pass by the small business every day. They may even 'hang out' in the "pedaço" as described in (Guimarães 2007). Fiado transactions are common in Brazil (Gonzales et al. 2013; Guimarães 2007; Magalhães & Abramovay 2008). It is an informal credit practice in which merchants sell products to a customer based on trust that the customer will pay for it in the future. The date for repayment of the loan is variable and informal e.g. "next week", "next month"; "I will pay it later". The use of fiado is a source of reciprocal tension. It relies on personal trust and good faith. And at the same time, it generates a mutual obligation where the customer is obligated to repay the loan and continue to shop at the establishment and the storeowner is obligated to keep offering store credit. The duality of informal store credit thus rests on the fact that, on one hand, storeowners are compelled to allow customers to use fiado to maintain their customers. On the other, the extent to which storeowners' trust that their customers will pay back their debts creates uneven relationships. In the extreme, the lack of payment will become a moral barrier and prevent customers from returning to the shop.

Typically, SBOs take notes in a notebook to remember their clients' purchases using fiado store credit (see Figure 2). They also use the notebook to record transactions where the SBOs had no change available and therefore owe the customer a small amount of money. Each of our participants had their own way of taking notes. One, a cake baker, only documents the delivery day and value of the purchase and says she always remembers the name of the customer by heart. Others take notes of customer names, purchase amounts and compute summary totals for new purchases made in the month. As some customers, do not pay the full amount at once, merchants deduct the amount paid by crossing out the current value and writing down the new amount owed by them. In general, SBOs are not very organized with their notebooks and many times they cannot find recorded transactions in the current notes. Other times they only record the customers' names and do not record the purchase value. As a consequence, the business owners are often not aware of exactly how much people owe them by week or month, which impacts their inventory management and limits their ability to predict future income.

1. There is an opportunity for digitization of financial information to help with account and inventory management. Observing how the SBOs take notes, which notes they claim to be more important, and researching client habits and account management may inspire designers to mimic those sequences of actions in digital environments. Financial modelling, if part of the design problem, needs to be done in a way that is easily understood and financial assumptions made transparent to the SBOs.

Another business owner who started her business selling ice cream and has now a well-established snack bar, told us her history and how she used fiado payments to pay her electricity bill. She was a middle-class woman and worked as a manager for eleven years. She faced some hardship when she lost her job and her husband left her with three children and barely any money.

> *I was left with 80 cents and my mother gave me R$ 20.00 [US$ 6.00]. My sister told me to make ice cream with that money, so she would offer to her friends. I did and started*

selling 5 mini ice cream pots of 100ml. When I was selling 10 pots, my sister invited me to sell them in the company she works for. I sold 30 pots in the same day. People started to stop me in the street to buy ice cream. […] I started selling in other companies, and then I was selling 100 pots per day. 100 x 30 cents that I had sold was R$ 30.00 right? I had R$ 30.00 minus fiados, because I had been selling at sight and fiado. Fiado transactions helped me pay for the electricity bill. When it was the end of fortnight, when they received their salaries, I had my notebook with me and they paid what they owed me. From that fiado I paid the electricity bill. (Participant 3)

The SBO in our study were often not happy selling their products using fiado as their customers do not always pay their debts back. In those cases, the merchants should contact the customers to demand repayment or in some cases even cease doing business with them. These impose great financial as well as social hardships to their businesses. For one, merchants face difficulties both in managing the portfolio of small loans and in anticipating future cash flows from fiado repayments. Merchants who we interviewed asserted that they carry out fiado loans to please their customers, to build up loyalty, and friendship.

If a customer wants to buy something here and he does not have enough to pay for it today, he takes the product home. In a supermarket, he cannot do that. (P11).

It is always a difficult social situation when a customer is unable to fully pay for the all the products she wants. Thus they may allow fiado as a store credit. But, on the other hand, storeowners have troubles when their customers fail to pay back. In some stores, owners in fact select carefully which of their customers with whom they carry out fiado. A woman gave up selling clothes door-to-door because of the high default rate which was the result from allowing her clientele purchase using fiado. Now she has a grocery store and only allows customers she completely trusts to carry out fiado. In rare cases, when some of her customers do not pay her back, she not only ceases doing business with them but also ends any kind of future social relationship.

I don't hold a grudge against anyone. Last week, one customer did not pay me back; I hope he never needs me, because I won't help him. (Participant 4)

1. Informal credit repayments constitute a potential future cash flow to the small business. The SBOs usually do not see fiado as a positive practice; they would prefer to receive the money on the same day rather than an uncertain day of payment. But providing credit to good customers is a sound financial practice for business since it grows the clientele and guarantees future cash flow. Therefore, design technologies which might help the SBOs interpret fiado in a positive way as future cash flow may support business growth. Additionally, SBOs know their clients better than the banks and this source of information can be valuable to banks (e.g. evaluating new and current customers for new loans).

2. Informal credit (fiado) is important to retain customer although constituting a repayment risk for the SBO. The close trusted relationships in those communities are what enable certain kinds of financial practices to exist. Great care must be taken in designing new technologically assisted products and services so that the sense of community remains intact. The design challenge is to support the development and maintenance of trusted relationships and generalized reciprocity.

8 From Field work to concept design

When the researchers returned to their Research Lab in São Paulo, debriefing sessions and design workshops were held with the extended research team (Author, 2015). The data gathered and design opportunities were the source of the design workshops. Those opportunities were explored and new ideas emerged towards designing an app for SBO. Several design opportunities for credit

agents were also discussed in the team workshops. For this paper, we chose to show a concept to help SBOs manage their business and increase their access to credit using fiado.

8.1 Concept scenario and prototype: The Financial app

Our observations of the prevalence of informal lending among the SBOs have encouraged us to envision the possibility of new financial management tools for small businesses. We illustrate one of our ideas, from our team design workshops with a concept scenario illustrated with prototype screens. (Figure 2).

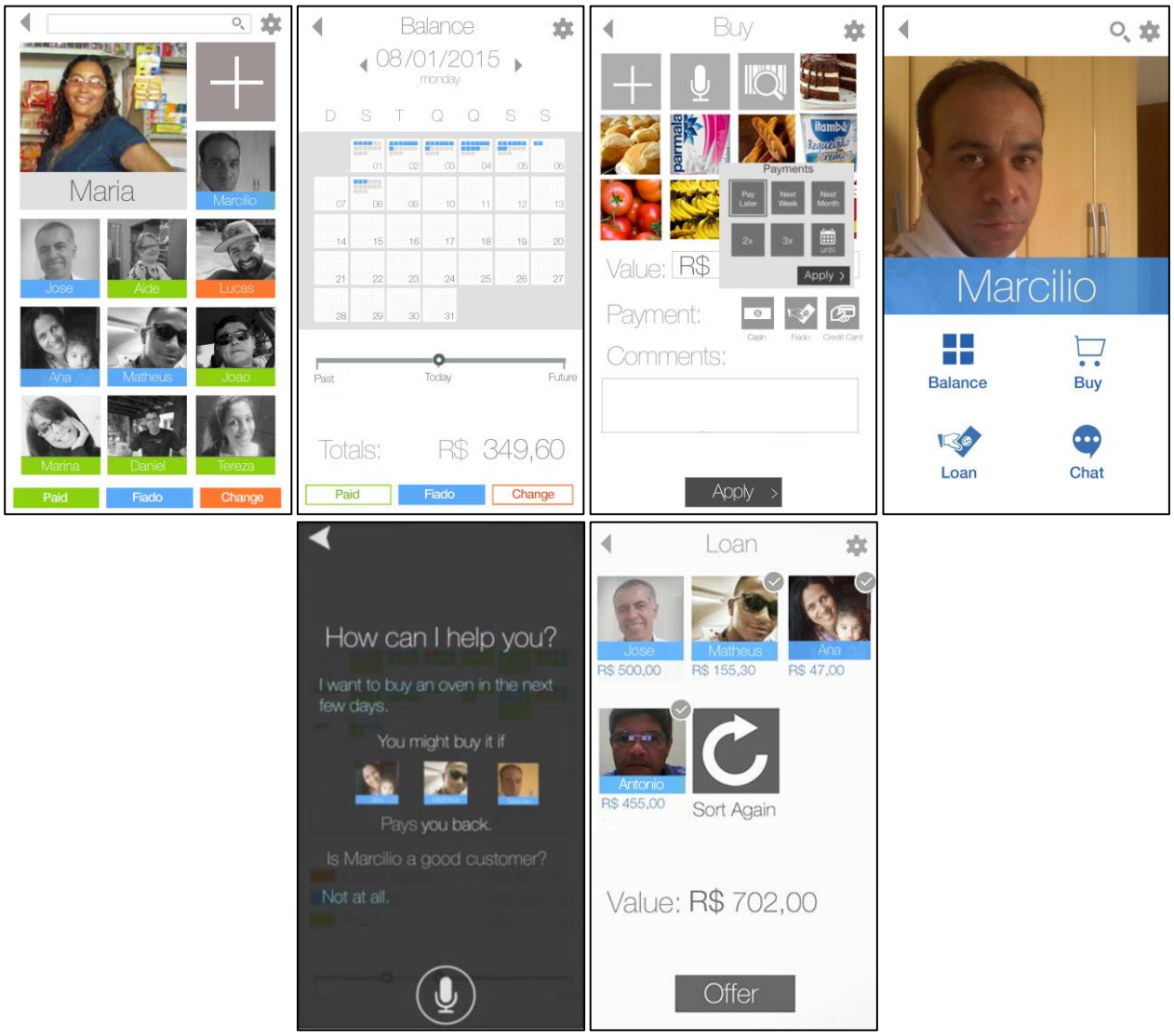

Figure 2 (a,b.c,d, e, f,g). Prototype screens.

Concept Scenario: Maria is a SBO and a microcredit customer. She is a cake baker and owns a grocery. She uses a financial app running on her mobile phone to record all sales transaction, including those in which the customer has requested a fiado loan. In Figure 3a, Maria can see photo links of her customers. She can see, at a glance, which of her customers have a fiado loan (in blue) so she reminds them of due payments. She can see the customers who paid on cash (green) and the ones who she owes money because she did not have change available (orange). The large photo of Maria is a reminder of the pride she takes in her business and when pressed provides a menu to access additional financial information about her business and her transactions (fig. 3b). On the main

screen (fig. 3a) she can also see all the pictures of customers who recently bought in her grocery. In Figure 3b, Maria can see a visual display of the transactions made over some period. A slider at the bottom can be altered to reveal future cash flow which is expected because of her portfolio of fiado loans. Since Maria has come to think about her fiado loans as financial "assets," she can better consider the overall health of her business. In Figure 3c, Maria can record a sale by entering details of the transaction including who made the purchase, the item, price, and whether it was paid in cash, credit card or by fiado and comments (e.g. owned change). Maria can record the fuzzy due dates of fiado transactions (e.g. pay later, next week, next month). Maria also can see in Figure 3e, information about her customers' balance, icon for new purchases, loans they might request her, and a chatroom for communicate with customers. Maria might want to buy a new oven, to bake more cakes. She can see a financial overview of her business in Figure 3b. Looking at the system predictions, Maria does not have money to buy a new oven in the next days although she has many outstanding fiados to collect soon. She consults an AI conversational system, in fig. 3f, to understand better the data. The system suggests her to wait for next month to buy the oven or trade her fiado transactions with the bank. As Maria is confident that her fiado customers will pay her back, she trades the fiado as a collateral with the bank to ask for a new loan. The system calculates who are the best customers to trade fiado based on Maria's transaction history. Maria knows a lot of other contextual information, such as who might have lost his/her job in the community, so she can unselect customers who are not good enough to be part of the collateral bundle score to send to the bank (Figure 3g). Maria is aware that the system only sends a number, a score bundle of her request (e.g. 1-5, 5 means good clients will are likely to pay Maria back soon). She requests the loan in the system and soon she will be able to be baking twice more cakes per day with the new oven.

In our view, this concept scenario illustrates how the SBO can better track store transactions, including fiado loans. The summary view of fiado would help the SBO identify trends over time and predict future cash flows (Figure 3b). Notice that the colors were chosen to minimize the negative interpretations of fiado loans: instead of red colors that emphasize negative connotations in finance – "to be in red", we used blue to represent fiado. This option might smooth negative interpretations. Orange was applied to signalize owned change to customers, as an alert to be aware of. To make it easier to entering of the transaction data and considering user literacy constraints, several input options are envisioned (i.e. speech, photo button, bar code, etc.). A functional prototype of this concept was developed to be tested in a future field study with SBOs.

9 Discussion and Lessons Learned

This brief description of the business and social milieu in which small business practices unfold and business owners and their clients establish and maintain (professional and often personal) relationships reveals the complex and often problematic relationship people have with their personal and business finances. Financial practices of micro and small businesses lie in a complex web of local and personal relationships, hardship and turn-around experiences, finance and business education, money availability, and the like. Unwittingly, those business owners should deal with not only complex sets of finance concepts and practices (such as, future cash-flows, store-credits, or interest rates) but difficult and often conflicting, decisions (e.g. to allow fiado credit, to ask for a repayment, or to cross out a client).

To design technology to support such practices is by no means simply a question of financial management—it is not just about a point of sales or another ease-of-use personal and/or business finance management system. It has also to be about relationship management. It should consider that business transactions are forms of social and cultural exchanges and shaped by local moral and cultural norms. For one, the decision of disallowing a client from purchasing a product because of

bad credit history should be situated in the context of the social relationships established between the storeowner and its client. It should not be simply unmediated or just attributed to financial factors (a purely financial decision). It should be made considering interplay of all those factors. On the other hand, what does it mean to make such social practices manifest aspect of business practices and thus becoming accounted for? More should be investigated about the complex relationships between financial practices and local social norms and morals. They are interdependent.

This is the other side of the coin when we discuss the relationships between SBO and their clients as well as between SBOs and MFIs. Often, people get trapped in negative credit spirals as they find themselves borrowing more money (payday or fiado loans, to be paid back when one's paycheck arrives) to cover an existing debt. In such situations, they tend to lack the mental "surplus" to make decisions which will results in more positive long-term benefits, rather than just short term fixes. In such circumstances, to anticipate such scenarios and to attempt to remediate them early enough might be the best ways to enable individuals manage their finance life.

As a reflective practice (Cross 1999), the time which we spent in the field, while limited, did make us aware of important methodology challenges. They influenced the ways in which we carried out the research activities. We were particularly cognizant of the following issues:

- **Finance is a private practice.** Considerable time and care needs to be taken to gain the trust of informants. For example, some of the financial practices could be considered part of a grey or black market and strict adherence to government reporting requirements is unlikely. Another example would be conversations about the debt profiles and repayment practices of specific customers. Overall, three lessons were learned in this context: First, fieldwork participants could communicate better when they were alone (e.g. no familiar member, no bank representative or no store customers). Second, the "break the ice intervention" (e.g. mirror) helped participants to feel more comfortable and set the mood to private questions. Third, several SBO from Icapuí received us with a welcome attitude serving coffee, fruits in their home that was normally located in the back of their business. In those moments trust, could be achieved with informal conversations. On the other hand, time availability for those kinds of interviews should consider those interactions.
- **The research setting follows the business flows.** We encountered several situations in which the interview was stopped by the SBO to take care of a supplier or customer. While this may have disrupted the flow of the interview, positive benefits were that the owner interaction often provoked a new line of questioning and researchers could observe everyday situations and interactions of SBO and their customers. Researchers should consider having more time for observation studies. Observation helped to provide rich information, validate SBO interviews and insights.
- **Diversity of practices and settings.** While our informants were from a narrow range of businesses and from only two geographic locations, we should admit that Brazil is a large and diverse country. In those two locations, we perceived differences of poverty and security situations. In the urban area, crime and drugs were more evident as well as misery. We learned that the local urban community leaders passed by the urban establishments to get information about the presence of researchers and what they were doing. In those situations, researchers should be assertive in explaining the objective of the study. The microfinance program is well-known and respected in those communities, what facilitated our entrance. In Icapuí, the small city in the semi-arid region, participants were more welcome and proud to receive us in their establishments. However, many times neighbours and other family members were curious about our work. Researchers focused their interaction with the interviewee who often assisted them to focus on the interview and not paying attention to others.

10 Final Remarks and Further work

The design opportunities are intended to suggest possible directions for designing new financial services and to provide guidelines for similar projects related to financial inclusion of the poor. We conceptualize our design research on financial practices for SBO in Brazil as an example of a design case study (Wulf et. al, 2011).

We hope our research process and findings are helpful for designers to use in projects with similar contexts. Our approach was to conduct individual semi-structured interviews rather than group discussions (e.g. focus groups) because finance is a private matter. The design concept of a financial app is a novel approach to help SBOs to manage their finances. Such a formal record of the SBO's financial history would help secure new bank loans to grow their business. Advances in machine learning, speech recognition technologies, data encryption and AI conversational systems may improve the accuracy and performance of our envisioned system.

Additional design work is required, and validation of these ideas in different cities and field-testing our prototype with SBOs in Brazil is needed. Moreover, cross-cultural research is required to understand how these results can be used in other parts of the world. The prototype illustrated here has been presented in a variety of settings, which has enabled us to gather feedback from audiences of different backgrounds, helping us with issues that we are considering for future research.

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Matching Data and Emotions for Designing Personalized Digital Experiences

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Digital innovations in-store are often unnecessary, unintuitive and uncomfortable and mostly make use of personal data for one-way messaging instead of meaningful interpersonal interactions. Digital initiatives are also more focused on enhancing the shopping experience (even unsuccessfully) instead of building consumer-brand relationship through an emotional brand experience. This paper introduces a new design framework which envisions a way of using personal consumer data for the design and development of in-store digital brand touch points. The aim of the framework is to improve consumers' in-store digital experience and their emotional connections with the brand. The foundational model for our framework is the Design for Emotion model developed by Pieter Desmet (2002). The model is used in a retail and branding context, and adapted to leverage the opportunities of personal consumer data in personalization strategies.

technology, data-driven design, design for emotions, personalization

1 Introduction

The fast rise of e-commerce and digital experiences is shaking traditional retailing (Shankar et al., 2011). Ultimately, the retail channels will complement each other to satisfy the needs of the customer (Zhang et al., 2010), resulting in a seamless integrated omni-channel shopping experience (Verhoef et al., 2015). However, to survive in the omni-channel landscape and to satisfy the increasing demand of immersive experiences, retailers should strategically consider and embrace the use of smart technologies in-store (Pantano & Timmermans, 2014). Although many retailers already invest in (IT) technology in-store, several problems arise in the implementation of these technologies. First, new digital interactions do not always fulfil the needs of the customers visiting the stores. The customers generally perceive the digital store efforts as unnecessary, unintuitive and uncomfortable (Silverman & Hogan, 2016; Pantano & Viassone, 2014).

Additionally, while literature suggests that the higher potential of integrating digital technologies in the retail experience resides in triggering 'symbolic' and 'emotional' experiences, retailers do not

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fully leverage this potential as their technology investments are prevalently aimed at 'efficiency in-store' (i.e. time saving technologies) (Rintamäki et al., 2007). Further research is needed to support retailers to move up the hierarchical shopping value ladder, from providing exclusively functional benefits to also addressing symbolic and emotional ones with in-store technology (Pantano & Timmermans, 2014). This is also confirmed by Ostrom et al. (2016), who, in their list of research priorities in the field of service innovation and management, prominently mention leveraging technology to enhance the customer experience and influence relationships between customers and service providers.

Finally, while personalization strategies – i.e., making use of personal consumer data - seem to be the solution to enhance customer experience, managers and retail professionals still have limited knowledge on how to apply them properly (Rust and Huang, 2014). In the marketing and retail context, personalization is often seen as a digital strategy by which companies leverage consumer data analysis and digital technology to deliver individualized messages and product offerings to current or prospective customers (Vesanen & Raulas, 2006). According to Mittal and Lassar (1996), the classical definition of personalization is the social content of interaction between companies and their customers. It concerns the manner in which companies relate to customers as people. The concept of personalization is supposed to capture this social component of interpersonal interaction (Mittal & Lassar, 1996). The current way of applying personalization seems to focus more on personalized messaging (one-way conversation) instead of creating interpersonal interactions (dialogue), as the classical definition proposed.

To sum up, although digital innovation is vital for retailers, its in-store implementation hardly reaches its potential benefits for consumer and brand experience. Furthermore, the current focus is on using personal data for one-way messaging, rather than for favouring interpersonal interactions and for delivering personalized emotional brand experiences. To address this challenge, this paper looks at how a design-driven approach for using personal data in digital interactions in-store can improve customer experience and trigger an emotional connection with the brand. Particularly, we first theoretically derive a design framework that combines the Design for Emotion model (Desmet, 2002) with the use of attitudinal data to guide the design of an in-store digital touch point that reinforces the brand experience and helps the retailer to improve its performance. To provide initial validation, the design framework is subsequently put into practice through a case study, namely the design of a new digital interaction for the in-store experience of a sports wear brand.

2 Designing for emotional engagement

To develop a design approach for developing in-store digital interactions that improves customer experience and the emotional connection with the brand, deeper insights into consumer behavior are needed. Research and practice have generally used the stimulus-organism-response model (s-o-r model) to map consumer behavior in a retail setting (Pantano & Viassone, 2015). In the s-o-r model, the "s" refers to an external stimulus, the "o" represents the effect of the stimulus on human affective response, and the "r" stands for the human behavioral response (Hsieh et al., 2012). As the ultimate goal of this model is explaining a behavioral response, its use does not necessarily lead to the creation of emotional consumer-brand relationships. On the contrary, the appraisal theory developed by Scherer, Schorr and Johnstone (2001) focuses on how a (brand) stimulus ultimately leads to an emotional reaction, thus offering a more suitable theoretical framework for the focus of this paper. According to the authors, the appraisal is an automatic evaluation of the significance a stimulus has for one's personal wellbeing. The meaning (appraisal) the individual attaches to the stimulus is responsible for an emotional reaction that, in the retail context, can lead to a better customer experience.

Drawing on the appraisal theory, Pieter Desmet (2002) developed a model for emotion-driven design of new products and services. It is a basic model as it applies to all possible emotional responses elicited by human-product interaction (Desmet & Hekkert, 2007). The model identifies the

three universal key variables in the process of emotion elicitation: (1) consumer concerns, (2) stimulus, and (3) appraisal.

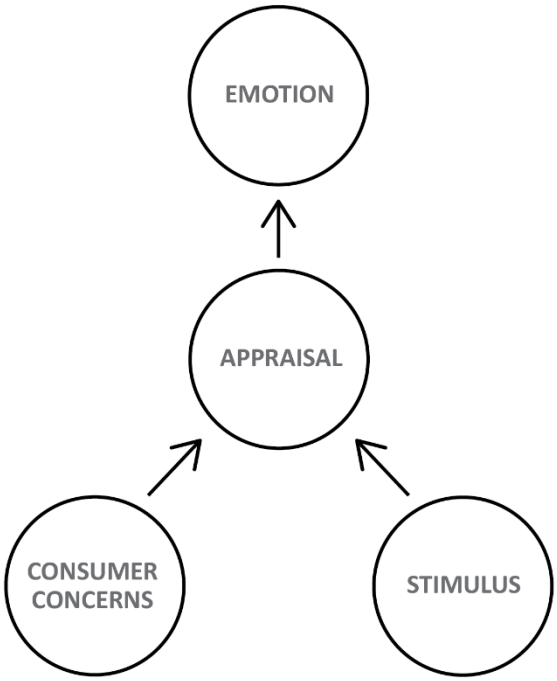


Figure 1 - Design for Emotion model (Desmet, 2002)

In order to understand emotional responses to consumer products, one must understand the users' concerns given the context in which the product is or will be used (Desmet & Hekkert, 2007). Consumer concerns reported in the research of Desmet (2002) are consumer goals, standards and attitudes. Some of these concerns are universal (safety or love), others are more personal. Additionally, just as in the appraisal theory, the model indicates that an emotion is not elicited by the product as such but by an appraised concern match or mismatch. Examples of product emotions mapped out in the model can be found in Figure 2 on the next page.

The mindset cultivated by this framework can provide guidance and structure for emotion-driven design practices. Emotion-driven design implies designing products and services with the deliberate intention to evoke predefined target emotions. After defining relevant target emotions and analyzing the consumer concerns, the right stimuli can be designed. Therefore, the model is particularly suitable for our research goal of using a design approach to develop emotionally engaging digital experiences. Targeting positive emotions stimulates product purchase intentions, repurchase intentions and product attachments (Desmet, 2012). As designers should not limit themselves to target generalized pleasure as emotion, Yoon, Desmet and Pohlmeyer (2013) offer a broad palette of diverse positive emotions - e.g. pride, contentment, desire and hope –, which have been initially identified in the context of product design, but can be elicited in any context and experience (e.g., interaction with people, events) (Desmet, 2002). Therefore, the Design for Emotion model can be used for a broader range of stimuli. In the context of designing in-store digital touch points, emotions can be targeted strategically, in line with the brand image, to trigger consumers' emotional engagement with the experience and the brand itself.

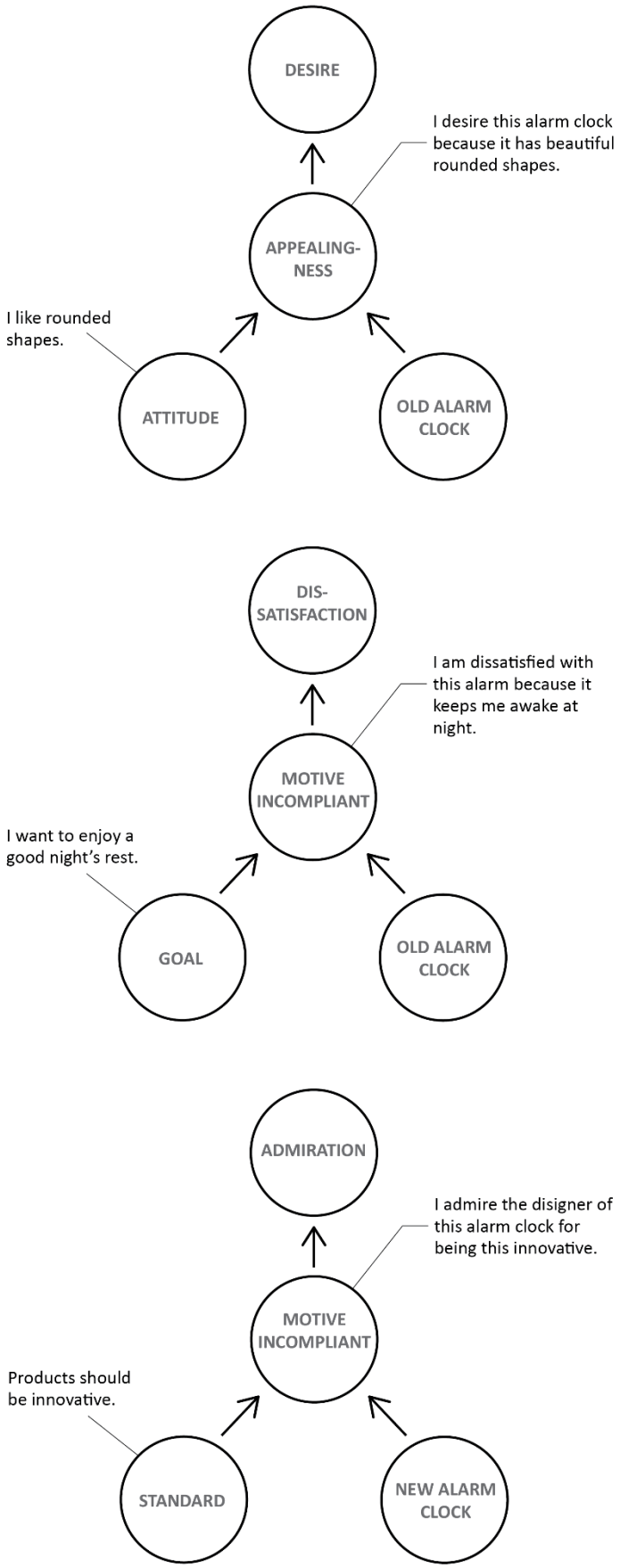


Figure 2 – Examples of filled in Design for Emotion Models (Desmet, 2002)

3 Designing with consumer data

To use an emotion-driven design approach for creating engaging in-store experiences, retailers should gather and analyse data on consumers' personality, as the personality has influence on the emotional consumer-brand relationship (Robins, Caspi, & Moffitt, 2000).

Nowadays, retailers are able to collect an enormous amount of data from their consumers through online channels and in-store digital initiatives. These data sets can be characterized as 'big data', since they are increasing in volume (amount of data), velocity (speed of data in and out) and variety (range of data types and sources). Nowadays the unprecedented volume, velocity, and variety of primary data is specifically available from individual consumers, resulting in the so-called Big Data revolution (Erevelles et al., 2016). Integrating the data of online channels and other customer touch points can give firms a more holistic view of their customers (Danna, 2002). But like any new technology, IT technologies for personalization practices are not error proof and are still mainly based on a data-driven approach to personalization. Accordingly, data is collected first, or is already available. Subsequently, consumer profiles are built from the collected data and used for personalization practices. Such profiles are based on past information and might emerge as an unreliable guide to future behaviours, emotions and experiences (Danna, 2002). Similarly, Kunz et al. (2017) state that a significant challenge of big data for customer engagement is the difficulty of collecting and reconciling customer data from a variety of channels and on a variety of topics, like relating to customer identity, profile, engagement history, preferences, decision-making and consumer behavior.

To circumvent these problems, Adomavius and Tuzhilin (2005) propose an alternative process-oriented perspective on personalization technologies, namely the goal-driven methodology. The personalization process should start with defining the project goal. Based on that, relevant data should be collected, in order to build relevant comprehensive consumer profiles for designing specific kinds of personalized experiences.

If we apply the goal-driven methodology to the context of this research, then the goal is to use personal data for understanding customers' personalities, to design personalized in-store digital experiences that create emotional connections. According to Hollander (1967), personality is a layered structure (see figure 3). The *psychological core* is the centrepiece of the personality, is constant over time, and is indicative of what the person is 'really' like. It includes attitudes, goals, values, interests, motives, and beliefs about the self. The *typical response* is the usual manner in which the consumer responds to different environmental situations. *Role-related behaviour* is the most superficial aspect of personalities, as it is most influenced by the environment.

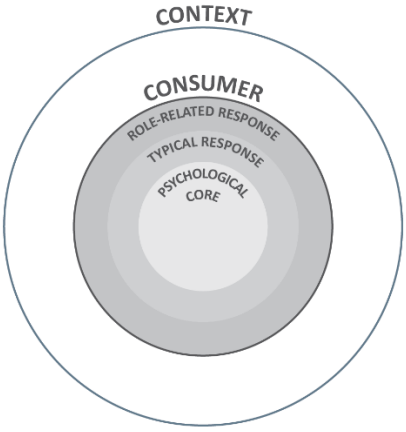


Figure 3 - Personality Framework (Hollander, 1967)

Using Hollander's perspective, the psychological core is the most important part for retailers to understand to be able to connect with the customers on an emotional level. Attitudinal data (i.e., data on opinions, needs and desires as opposed to behavioural data or demographic data) is therefore the most interesting to use in personalization strategies, as it also reflects opinions, lifestyle characteristics or personal values of the consumer (Rud, 2001). Attitudinal data can be used to gain insight into the psychological core of the consumer. During the design process, research should be conducted to define what kind of attitudinal data is relevant to measure and use in the retail and brand's context, to create the desired emotional connection.

4 Connecting the dots and deriving a design framework

Based on the previous insights, a new design framework is developed and shown in figure 4. This design framework envisions a way of using personal attitudinal data of the consumer in a retail context, to build in-store digital experiences that engage customers at an emotional level. To reach this goal, the foundational model remains the Design for Emotion model (Desmet, 2002). The digital touch point in-store is seen as stimuli in the emotion-eliciting process. However, the touch point should be designed deliberately to elicit target emotion(s) and, at the same time leverage attitudinal data of the consumer. So attitudinal data should go back and forth between the consumer and the stimuli, to tailor the emotional experience towards the consumer.

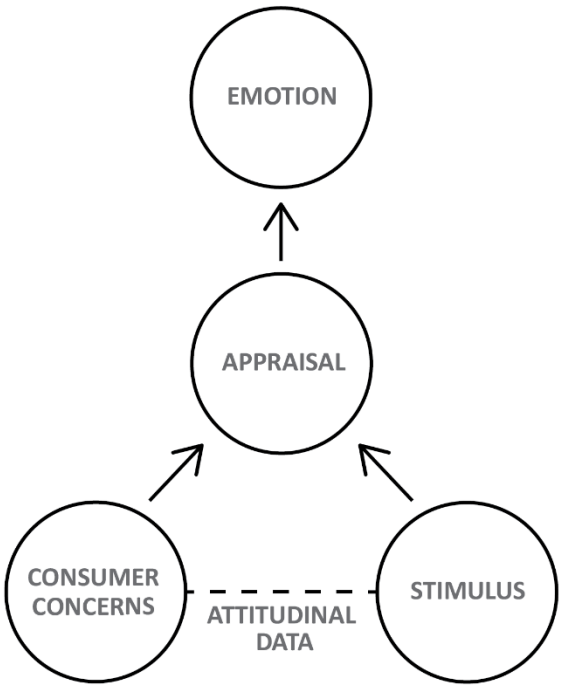


Figure 4 – The adapted design framework

The different elements of the framework (target emotions, appraisal, consumer concerns and attitudinal data) should be defined during different stages of the design process. The stimulus should eventually support its iterative execution in a way that it is aligned with both the target emotion and the consumer, and makes use of the attitudinal data. Each element of the design framework and its role in the design process will be explained in more detail in the next paragraphs, by means of a case study in which the framework is put into practice.

5 Applying the design framework – A case study

To illustrate the application of the framework, we used the case study of designing a new in-store digital touch point to improve the customer experience for an international sport brand. The design process for developing the digital interaction included three phases (inspiration, ideation, and

prototyping), each of which was driven by and iterated with the different elements of the framework. The outcome of the case was the concept of the Fitroom, a digital immersive fitting room experience making use of attitudinal data (insights in the consumer goals in sport) to tailor the communication and environment of the fitting room towards the consumer.

In figure 5, a summary of the outcomes related to the design framework is given. Each element is explained in more detail below.

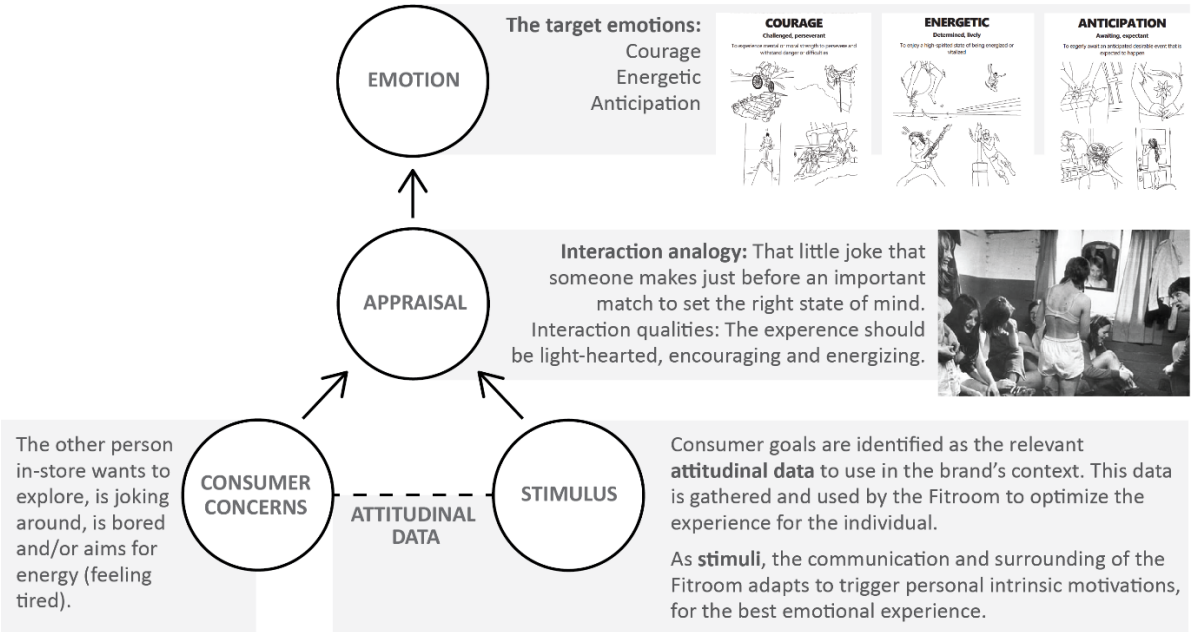


Figure 5 - Summary outcomes case-study

5.1 Target emotions

To foster customer engagement, the digital touch point should be designed deliberately to elicit certain target emotion(s). These target emotions should fit with the brand strategy, be distinctive from competitors, and not conflict with consumer expectations. The process started with the selection of the right target emotions, based on the insights gained during an internal analysis of the company, an external analysis of market and competitors, and targeted consumer research. External and internal experts were consulted to verify the selected emotions. Ultimately the emotions courage, anticipation and feeling energetic were chosen.

5.2 Appraisal

When target emotions are selected, the desired appraisal of the brand touch point can be defined. The desired appraisal could be defined as a product independent sentence (Desmet, 2002) and can take the form of an interaction vision, with an interaction analogy and interaction qualities (Pasman, Boess & Desmet, 2011). In the case study, the identified target emotions are used as inspiration to set up the interaction vision. Eventually, '*that little joke that someone makes, just before a match or an important presentation, to reduce the tension and to set the right state of mind for action*' is chosen as illustration of the desired interaction and emotional response in-store. It represents the rich combination of the different target emotions. Jokes encourage individuals in a positive way, giving hope for success in the analogy used for the interaction vision. In the context of the in-store digital experience, a joke would energize the users and create a sense of enthusiams for the digital experience. This results in the final target emotion, anticipation. From this metaphor, the interaction qualities are derived. The experience in the sport brand store should be encouraging, energizing and light-hearted. This can be seen as the desired appraisal of the stimuli in the 'design for emotion' model.

5.3 Consumer concerns

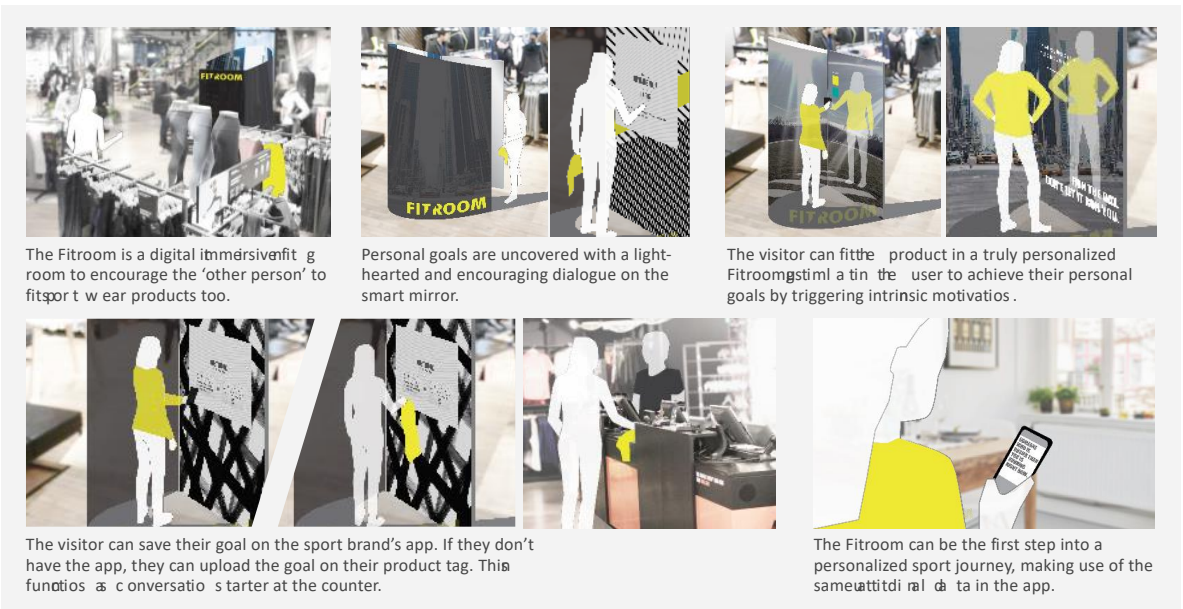
To start the ideation phase based on the above interaction vision, a relevant target group and its specific concerns are selected. In the case study the 'other person' in-store is defined as target group. The 'other person' is the person who has not decided to go in-store but is following their friend or family member. Most of the time, this person is not really looking for something specific and is waiting. He or she is therefore not fully engaged by the sportswear brand, but still represents a potential customer. The sportswear brand can increase its consumer base by targeting this consumer group in their stores. During interviews with store visitors and workshops with those potential customers, their concerns were analysed and clustered in four main categories, namely the 'other person' in-store: 1) wants to explore, 2) is joking around, 3) is bored and/or 4) looks for energy.

5.4 Attitudinal data

As proposed by the design framework, the emotional experience can be tailored towards the consumer making use of attitudinal data, thus achieving personalization in the emotional experience and individual engagement with the brand. In general, research is needed to determine which kind of attitudinal data fits a particular case. In our case study, consumer research has shown significant differences in consumer goals when engaging in sport activities. We regarded the different sports goal as relevant attitudinal data for the sportswear brand to know. Having these insights, the sport wear brand could better trigger the intrinsic motivations of individual customers, and align the digital experience accordingly. Currently, the sports brand has no relevant attitudinal data of the consumer's goals, but access to those can be achieved by leveraging other digital touch points of the same brand, or by designing the digital interaction as a data collection moment.

5.5 The stimulus: the digital touch point

Based on the internal analysis, external analysis and consumer research and by making use of the design framework, the following design challenge for the in-store brand touch point was formulated; *the interaction design in the store should let the 'other person' feel courage, anticipation and energetic by triggering personal intrinsic motivations.* The setup of the Design for Emotion brainstorm workshop as described by Desmet (2002) was used as guidelines for the brainstorm sessions during the ideation phase. After multiple iterations, three concepts are chosen in line with the design challenge. The concepts were further evaluated by means of (among the rest) the consistency with the interaction vision, and one final concept was selected: the Fitroom. The interaction scenario of the Fitroom can be found on the next page, figure 6.



The Fitroom is a digital immersive fitting room to encourage the 'other person' to fit sport wear products too.

Personal goals are uncovered with a light-hearted and encouraging dialogue on the smart mirror.

The visitor can fit the product in a truly personalized Fitroom stimulating the user to achieve their personal goals by triggering intrinsic motivations.

The visitor can save their goal on the sport brand's app. If they don't have the app, they can upload the goal on their product tag. This functions as a conversation starter at the counter.

The Fitroom can be the first step into a personalized sport journey, making use of the same attitudinal data in the app.

Figure 6 – Interaction scenario Fitroom

The Fitroom is a digital immersive fitting room to encourage the 'other person' to try on products too. The fitting room can be optimized making use of attitudinal data. Personal consumer goals in sports are uncovered with a light-hearted and encouraging dialogue on the smart mirror. The visitor can try the product in a truly personalized Fitroom, stimulating the user to achieve their personal goals by triggering personal intrinsic motivations. The Fitroom can be the first step into a complete personalized sport journey facilitated by the sportswear brand, making use of the same relevant attitudinal data uncovered by the Fitroom.

Rapid prototyping, including low fidelity prototypes and feedback loops, was used to receive feedback in the early stages of the development process of the dialogue on the smart mirror (figure 7). An analysis of the external communication of the sport brand's campaigns was used as input for the first version of the personalized communication on the smart mirror, with the goal of further improving and personalizing it by means of the attitudinal data received during the digital dialogue. In a later stage of concept development, qualitative feedback sessions with retail and branding experts and with potential customers have been conducted. The respondents gave feedback on the Fitroom experience by means of the interaction scenario and a digital prototype of the dialogue on the smart mirror, since further development of the Fitroom was not feasibly yet. The prototyped dialogue was indeed perceived as lighthearted, as the respondents often had to laugh during the tests. Additionally, the dialogue was perceived as encouraging thanks to the included motivational messages. Based on the interaction scenario, users mentioned that the Fitroom has high potential to be seen as an immersive and energizing digital experience. Based on the positive feedback, the concept was assessed as comet the requirements of the design challenge and the accompanying interaction qualities.

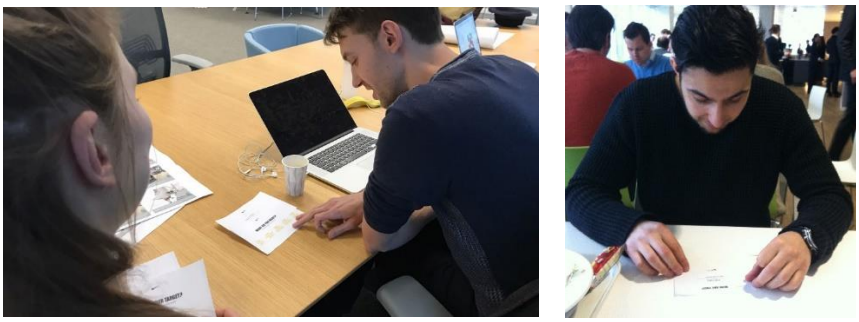


Figure 7 – Paper prototyping of the dialogue on the smart mirror in the early development phase

6 Discussion

6.1 Design framework evaluation

The goal of the paper was to develop a design-driven approach to integrate emotions and data in the development of engaging in-store digital experiences. We used the Design for Emotion model (Desmet, 2002) as a starting point, and integrated it with the use of attitudinal data to optimize the digital touch point and for delivering the best emotional experience.

The adapted design framework as presented in figure 4 was successfully used during the design process. Especially during the inspiration phase, the framework was useful as guidance in setting up the design challenge. Eliciting emotions in line with the brand was chosen as main goal of the in-store interaction design. This was a new approach for the stakeholders in the case study, since key performance indicators such as increase of in-store revenues were more common. During the design process, the stakeholders were engaged in the brainstorm sessions and feedback sessions. Emotion-driven design was a new approach for the participants, and was perceived as truly inspiring and innovative, triggering the willingness of using the design framework for similar projects. As a result, this case study provide evidence for the possibility of extending the applicability of the Design for Emotion methodology (Desmet, 2002) also in the context of retail, branding and design with data. The design framework can support retailers to move up the hierarchical shopping value ladder,

addressing emotional values with in-store technology, instead of providing only functional benefits, as envisioned by Pantano and Timmermans (2014).

Additionally, during the design process, the goal-driven approach as described by Adomavius and Tuzhilin (2005) is applied in combination with the emotion-driven design method. During the inspiration phase, the goal of the personalized service is defined, and relevant attitudinal data (i.e., consumer goals in sports) is selected to be measured and used in the interaction design. In the Fitroom, attitudinal data are used to adjust the communication with the smart mirror in order to trigger personal intrinsic motivations. The evaluation of the concept suggests that using attitudinal data for personalizing the experience in the fitting room can lead to a better emotional response of the visitor. During feedback sessions, users were positive about the communication (motivational messages on the screen) and the fact that it could be adjusted to their personal goals. It would not have been possible to trigger personal intrinsic motivations when using e.g. behavioural personal data already available by the retailer (such as shopping history) or demographic data (such as the age of the consumer). This is in line with the proposition that attitudinal data could be used to optimize the emotional experience. Complete validation of this statement from a consumer perspective should be done through further piloting of the concept and further research, for instance by comparing the emotional responses of different kind of personalization strategies.

6.2 Implications

6.2.1 Theoretical implications

The design framework functions as guidance in personalized emotion-driven design practices making use of consumer data. The framework can be applied when designing digital touch points, in order to build an emotional and personalized consumer-brand relationship. The framework can help retailers to deliver symbolic and emotional shopping value through technology in-store. In this way, retailers are able to move up the hierarchical shopping value ladder provided by Rintamäki et al. (2007). Additionally, the framework provides valuable help to leverage the potential of data to improve customer-firm relationships in a service context, which was needed according to Ostrom et al. (2016).

6.2.2 Managerial implications

The emotion-driven design methodology for brand touch points can help as an approach when designing new in-store digital interactions with a focus on brand-related goals. By deliberately targeting distinctive emotions in line with the brand strategy, the touch point can increase emotional engagement and, subsequently, lead to a closer consumer-brand relationship. This could also be applicable to other kinds of brand touch points and in different business sectors.

As for the case-study, relevant personal attitudinal data of consumers for the sports wear brand were identified. The Fitroom is one outcome of using these attitudinal data to optimize the brand touch point in order to enhance individual emotional experience. The vision on the use of attitudinal data can be applied to other brand touch points of the sport brand too. For example, the on-boarding of digital services (such as the sport applications) could start with a same kind of dialogue as on the smart mirror of the Fitroom. Additionally, the website could make use of attitudinal data as well, for example by adjusting the communication or product offering. When collecting and making use of attitudinal data, retailers do have to take legal restrictions into account (e.g., European General Data Protection Regulation, coming into effect in May 2018). The main implication of the regulations in this context is that customers have the right to access and to delete their personal data collected by the retailer. In the case of the Fitroom, these regulations will apply when the visitor saves the collected data with the sport brand's app.

6.3 Limitations

The definitions in the framework can be misinterpreted, especially 'attitudinal data', as it can be interpreted from data science, psychology and design perspectives. For example, attitudinal data can be interpreted as data reflecting 'attitudes' as used by Desmet (2002). These are beliefs as 'I like...'

and 'I dislike...'. In psychology, attitudes are defined as the stored feeling people have about particular people, objects, events or ideas (Zimbardo, McDermott, Jansz & Metaal, 1995). In the data science context, attitudinal data cover a broader range of data (Rud, 2002). In this framework, attitudinal data cover the same broad range of personal data as presented in data science context.

Additionally, not every brand touch point can be adjusted making use of personal data for an optimal emotional experience. Only digitally influenced brand touch points can be adjusted making use of attitudinal data. Using attitudinal data to make real-time adjustment of printed collateral or store layout to optimize individual emotional experience is not possible (although one should never say never).

Furthermore, the design framework relies on the assumption that consumers are willing to share their attitudinal data. In the case study, the attitudinal data is collected anonymously and the value of the personalized Fitroom is experienced first. Only after experiencing the direct value of the personalised service, the consumer is asked to save the data on the app account. The consumer's needs and values on sharing personal data should be kept in mind when applying the design framework (and corresponding vision) to other cases.

6.4 Further research suggestions

Based on the outcomes of this paper, suggestions for further research can be listed. As mentioned before, the design solution should be validated from a consumer perspective, in order to have first-hand evidence of whether the personalized experience based on attitudinal data leads to a better emotional experience. Therefore, different personalization strategies should be compared, making use of different kind of personal consumer data.

Additionally, it should be validated from a consumer perspective whether the brand touch point designed deliberately to elicit emotions in line with the brand strategy eventually leads to a better consumer-brand relationship. This can be done through quantitative research, such as surveys.

Finally, the design framework and design methodology should be applied to other cases, to see how applicable it is for other sort of brand touch points and business sectors.

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From Wicked Problem to Design Problem: developing actionable briefs and solution opportunities through a collaborative, multidisciplinary design-led approach

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This paper argues that using a design-led approach is highly beneficial when tackling complex problems to transform ambiguity into actionable design briefs and solution opportunities. This is evidenced by way of an ongoing project with a large public-sector organisation. Northumbria University's School of Design academic experts use design-led approaches to innovation that promote 'creative fusion' between diverse stakeholders in order to tackle 'wicked problems'. The authors continue this work as part of an AHRC/ERDF-funded programme entitled Creative Fuse North East (CFNE), along with five regional universities, of which the project discussed here is a part. The main objective of which is to develop and deploy approaches to innovation that apply skills from creative graduates to benefit the wider creative economy, address barriers to innovation and promote growth and sustainability within and without of the Creative, Digital and IT sector (CDIT). It will be argued that to do this it is vital to convert stakeholders into co-creation activists empowered with the creative confidence required to speculate about uncertain futures.

design catalysts, co-creation, problem framing

1 Introduction

Many problems we face today are ill-defined, networked, dynamic and seemingly intractable (Dorst, 2015). We may feel as though we do not know enough to solve them. Such problems have been termed 'wicked problems' (Rittel & Webber, 1973). Much has been written about the importance of looking at the world as interconnected, where relationships are shaped by their historical and cultural context, as opposed to seeing the world from a deterministic and predictable perspective (Boulton, Allen, & Bowman, 2015). Accordingly, the factors that shape complexity in our world are systemic, path-dependent, contextual, emergent and episodic (Boulton et al., 2015). We therefore have to take account of many factors.

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Wicked problems require specific working practices to frame and address them, "[w]e are at a critical point where rapid change is forcing us to look not just at new ways of solving problems but to new problems to solve" (Brown & Katz, 2009). We cannot achieve this in isolation as individual knowledge can only be partial (Russell, 2010). Rather, collective wisdom from multiple disciplines must be directed towards a common goal, i.e. tackling the wicked problem. Furthermore, the methods of inquiry and decision-making need to be flexible so that one can remain open to revisions in response to new information (Russell, 2010). It is not straightforward to work collaboratively or to work within an ambiguous and complex space such as this. Collaborators and stakeholders can bring conflicting requirements and their personal or institutional perspectives to collaborations (Brown, 2010; Dorst, 2015) and uncertainty can be uncomfortable. Here, a design-led approach can be invaluable.

A design-led approach has been argued to offer a holistic way to tackle complex, ill-defined and ambiguous problems (Hocking, 2010; Lam, 2017). When applied during the 'problem framing' phase of a project, it can transform seemingly intractable, complex problem spaces into actionable briefs and solution opportunities that bring clarity, meaning and direction (Dorst, 2015). The value that design practice can bring to different problem spaces has been established, for example in the context of business innovation (Bucolo & Matthews, 2011; Gulari & Fremantle, 2015; Innovate UK, 2015; Wrigley, 2017). Often, the special way that designers think and do things is cited (e.g. Cross, 2006). This can be captured as a working practice involving flexibility and action. For example, Hocking (2010) describes designers as considering:

> *questions about what could, should or ought to be [...] through the ability to enact knowledge in an iterative process where the identity of the designer is central and the paths they follow have dynamic variability [...] characterised by playfulness and praxis, bridging knowledge and action. (p. 244)*

These abilities are employed strategically within organisations to enable them to: identify emerging opportunities; investigate and visualise how issues are interconnected within ill-defined problem-spaces; frame focused questions to tackle the core issues; and collaborate with diverse disciplines through design-led methods and tools (Lam, 2017). However, it could be argued that Hocking's (2010) 'identity of the designer' should be replaced by the '(designerly) identity of the team'. This change reflects the importance of co-creation, evidenced in this paper by way of a case study involving a collaboration between Northumbria University's team[1] and Northumbria Police. This project is part of a large research programme entitled Creative Fuse North East (CFNE) which seeks to develop and deploy approaches to innovation- that apply skills from creative graduates to benefit the wider creative economy, address barriers to innovation and promote growth and sustainability within and without of the Creative, Digital and IT sector (CDIT). This innovation approach has been previously termed as 'creative fusion' (Garner et al., 2014; Sapsed et al., 2013).

This paper focuses on how design-led approaches can transform wicked-problems into actionable design opportunities. The paper describes, through a case-study review, the multiple enablers that design-led approaches afford multidisciplinary, co-creative teams when addressing seemingly intractable, networked problems. The case study in question addresses the complex, wicked problem of cybercrime vulnerability. In this case study, the team have enabled people to work together in this uncertain and complicated environment in order to reach strategic solution opportunities. This has been achieved through facilitating those who may not feel comfortable with ambiguity to welcome it and encouraging people to bring ideas to life in ways that encourage speculation and 'what if?' questions (Coyne, 2005).

[1] Collectively known as 'the team', Northumbria University's Creative Fuse North East team consists of design-led innovation academics, researchers and Innovators in Residence (IiR) – recent Masters Graduates who support the projects whilst being mentored by the University as they launch their own businesses.

2 Context: A design-led approach to multidisciplinary teams, co-creation and problem framing

The value of multidisciplinary teams within industry has been established, for example Bailey, Aftab, and Duncan (2014) discuss a design-led context, Gibbons et al. (1994) argue that these teams are flexible and responsive, and the cultural and economic benefits of multidisciplinary work have been promoted (Wallace & Barber, 2013). A breadth of knowledge and perspectives seems likely to produce a breadth of solutions (Alves et al., 2007). However, meaningful collaboration enables teams to be more than the sum of their parts and achieve things they could not have done by working individually. Amongst other benefits, multidisciplinary teams can act as 'outsiders' to each other to identify and question assumptions (Nissani, 1997). Previously separate concepts, expertise, products or services may be united in new and unexpected ways to create innovative solutions (Fong, 2003; Nissani, 1997) and "new ways of thinking, communicating and working" (Bailey, Smith, & Aftab, 2013, pp. 12-13). These are not new ideas, but they remain pertinent evidenced by, for example from policy (Department for Business, Energy & Industrial Strategy, 2017). Particularly relevant to this paper are recent proponents of using designers to instigate and facilitate collaborations, for example calls from industry (Design Council, 2015) and academia (Bowen et al., 2016; Sanders & Stappers, 2008).

Hand-in-hand with a multidisciplinary approach, the authors advocate an inclusive process, where stakeholders are actively involved as experts during problem framing activities (Björgvinsson, Ehn, & Hillgren, 2010; Broadley et al., 2016). In the project described below, stakeholders 'co-created' the knowledge base, design briefs and solution opportunities. Co-creation is a broad term, but can be loosely defined as two or more people working creatively in collaboration (Sanders & Stappers, 2008). This approach is based on the principle that everyone, with good facilitation, can be creative (Stappers and Sanders, 2008). A design-led approach to co-creation includes activities that encourage participants to (amongst others):

- visualise information to enhance understanding and communication (Schoffelen et al., 2015);
- make physical things to make sense of the problem space and prototype ideas (Sanders & Stappers, 2014; Vaajakallio & Mattelmäki, 2014);
- look at issues from different perspectives, for example through storytelling (Bornet & Brangier, 2016)
- engage with ideas in a meaningful way through play (Björgvinsson, Ehn, & Hillgren, 2012a; Gray, Brown, & Macanufo, 2010).

Multidisciplinary co-creation presents challenges, especially when working with 'wicked problems', that can be addressed through a design-led approach. All collaborations can sometimes be difficult and this may be heightened when participants come from different backgrounds. For example, teams need to build trust (Broadley et al., 2016), identify a common purpose (Spencer et al., 2017), and find effective ways to communicate and generate a collective knowledge base (Sanders & Westerlund, 2011). Furthermore, roles must be clarified (Facer & Enright, 2016) and conflicting perspectives managed (Björgvinsson, Ehn, & Hillgren, 2012b). Therefore, collaborations require facilitation as people may not have worked in this manner before, "people live and socialise in unfused professional, disciplinary and social communities. When these different cultures are brought together, it often exposes cultural mismatches rather than creative opportunities" (Sapsed et al., 2013, p. 68). A design-led approach can be used to address these challenges and ensure groups arrive at implementable outcomes (Norman & Verganti, 2014).

A design-led approach helps collaborators to accept the inherent ambiguity in the imperfection of wicked problems through activities which frame ambiguity positively as a space for speculation (Dorst, 2015). Being prepared to speculate to build a deeper understanding is a key capability within design and innovation practice (Sanders & Stappers, 2014). By employing designerly methods, these

speculations can be brought to life in physical, visual or narrative forms. Generating multiple potential speculations and solutions both develops the team's understanding of the problem, i.e. 'framing' it, and facilitates refinement of the most promising solutions into viable propositions (Boer & Donovan, 2012).

Problem framing involves collecting perspectives from stakeholders, systematically visualising and interrogating this information, and then using it to generate more pertinent and strategic questions (Lam, 2017). One aspect of this is balancing goal-orientated and experimental activities (Lam, 2017). De Mello Freire (2017) frames this as pursuing non-linear thinking (characterised by changing circumstances, multiple parts, and adaptability) in a manner that is beneficial rather than detrimental to linear thinking. This activity may appear chaotic and undirected (Sanders & Stappers, 2008). Nevertheless, there is an overall trajectory towards more definable and actionable briefs and solution opportunities. It is this trajectory that this paper explores.

Co-creation at Northumbria University (NU) is grounded in design practice and supported by business knowledge. It uses strategic, creative and generative methods to encourage innovation. The key ways that the team facilitate this way of working can be summed up by 6 'co-creation enablers' which pick up on some of the themes from the literature highlighted above:

- Enabler 1: Environment. A safe environment is created which includes both appropriate physical space and resources, and a supportive non-judgemental intellectual and visceral space for open engagement (Bailey & Smith, 2010).
- Enabler 2: Attitude. An open and questioning attitude (Michlewski, 2015) is facilitated based loosely on Sinek's (2011) 'why, how and what' questions. However, critically, these are accompanied by 'what if?' questions in order to generate provocative speculations, the genesis of concepts (Bailey et al., 2013).
- Enabler 3: Structure. A confident, deliberately semi-structured approach is taken which is open to change as circumstances change and ideas develop.
- Enabler 4: Visualisation. A range of tools used to translate 'what if?' questions into tangible forms to aid communication, sense making and reflection (Björgvinsson et al., 2012b; Schoffelen et al., 2015).
- Enabler 5: Participation. Establishing and engaging with a network of stakeholders to contribute diverse knowledge and expertise. Participants include experts (who contribute knowledge) and activists (who are involved in co-creation activities) indeed participants may be both.
- Enabler 6: Agents. Students are catalytic agents in a problem situation due to their 'creative naivety' (Bailey, Aftab, & Smith, 2015) - they are curious and knowledgeable, and give 'professionals' permission to work creatively and ask naive questions which often challenge company-held perceptions and preconceptions around the problem space.

Application of these enablers will be traced through the case study. This serves to demonstrate some of the highly beneficial ways a design-led approach can help frame wicked problems through facilitating meaningful collaboration and co-creation between people from diverse backgrounds.

3 Raising Awareness and Changing Behaviour: From a wicked problem to actionable solution opportunities

Earlier, we proposed 6 co-creation enablers that support people as they move a wicked problem-space from a position of ambiguity to one where there are strategic and actionable opportunities. This is evidenced and explored further here by way of a case study. This case study is part of NU's ongoing collaborative innovation project with Northumbria Police.

The project responded to challenges associated with digital policing practices around cybercrime and cybersecurity. This challenge is a true 'wicked' problem; it is large in scale, involves multiple stakeholders and is ill-defined, for example key factors are rapidly changing and difficult to clearly

establish. The project has involved 12 key design-led activities to date, labelled here with a letter (A, B, C and so forth). A summary of these activities is depicted in the project journey timeline below Figure 1 & 2.

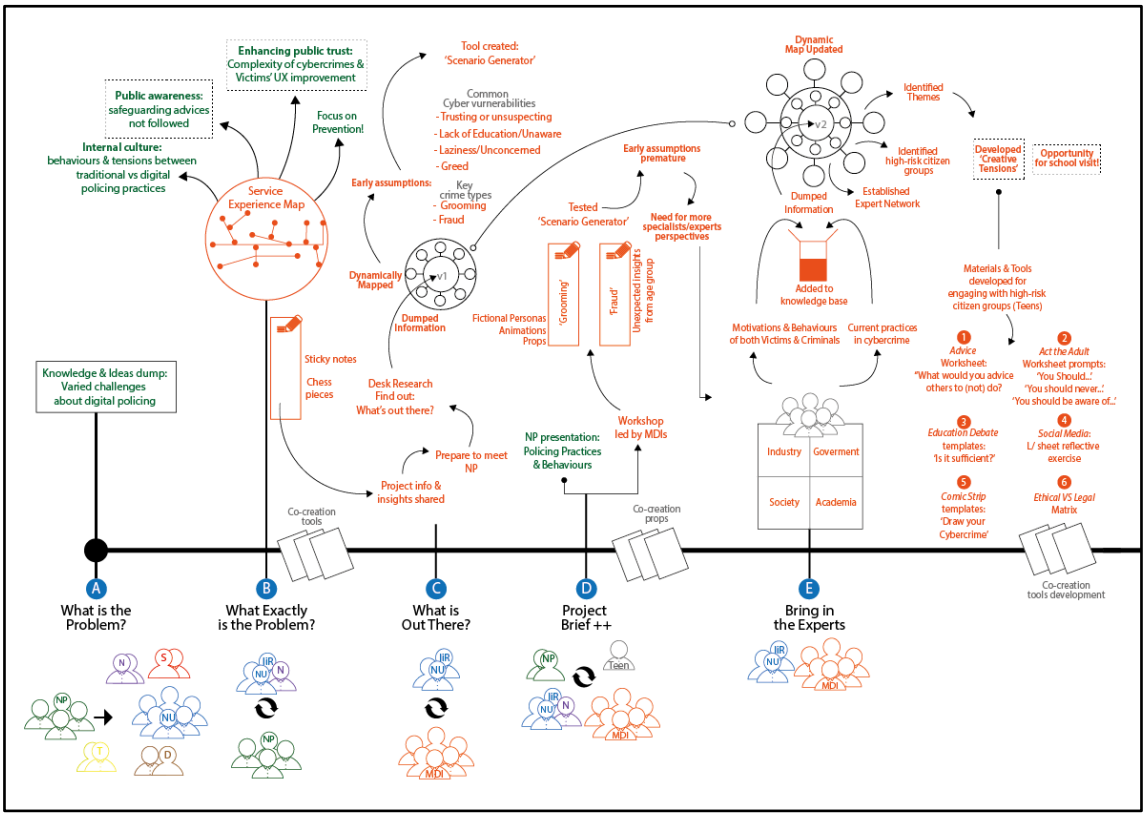

Figure 1. Part 1 A timeline of the project's innovation journey, illustrating the key design-led activities undertaken to date

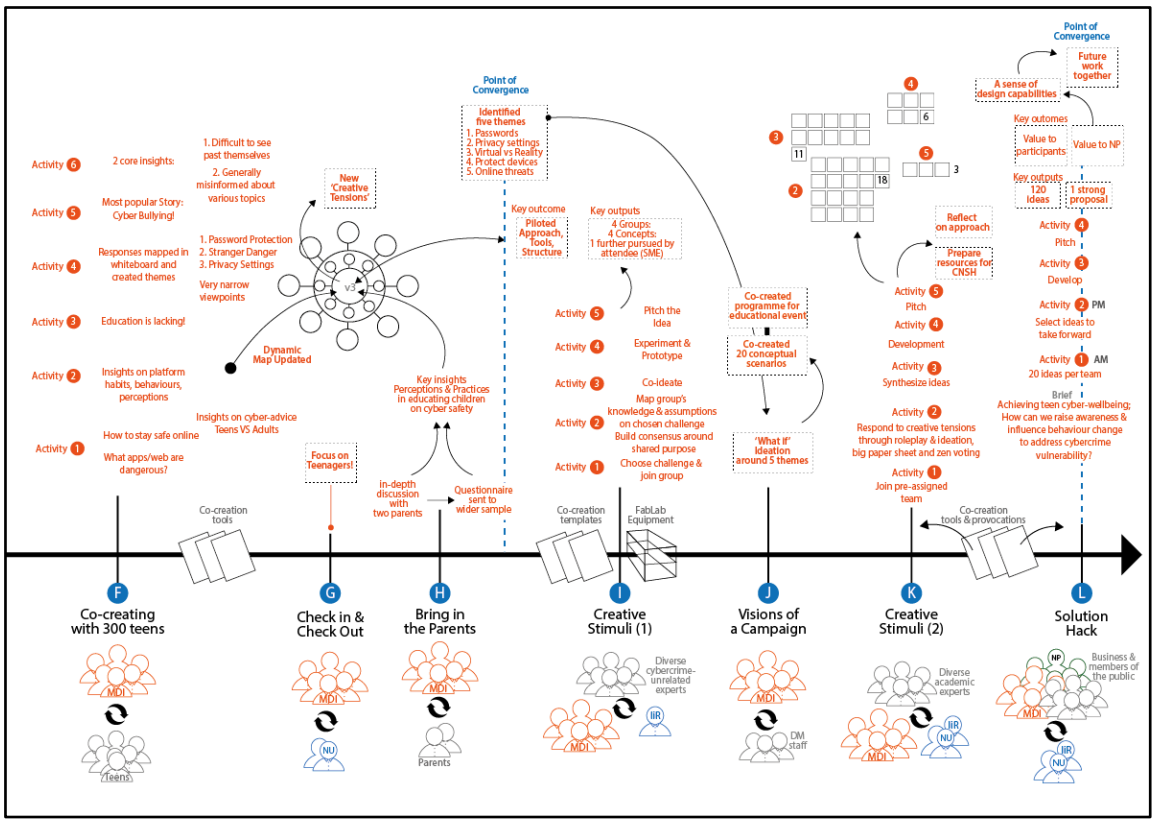

Figure 2. Part 2 A timeline of the project's innovation journey, illustrating the key design-led activities undertaken to date

3.1 Project Activities

3.1.1 A: What's the problem?

During facilitated preliminary conversations with Northumbria and CFNE partners, police representatives highlighted areas of cybercrime policing that they saw to be key concerns. These included crime prevention initiatives such as creating changes in the culture and behaviour surrounding internet use, engaging with local software developers and horizon scanning, and to issues with investigation, such as improving internal communications within the police. NU proposed to narrow the focus of the project to behaviour change and to consider ways to tackle unsafe digital practices (e.g. leaving the Bluetooth on, not applying privacy settings or not installing updates). The project goal was to co-create design proposals with small and medium-sized CDIT businesses, students, academics and Northumbria Police staff which could then be developed further in the future.

3.1.2 B: What exactly is the problem?

This 2-hour session aimed to find out more about the challenge as perceived by the problem-owners (Northumbria Police). The team's key objective was to foster mutual understanding around the challenges. This was done through questioning and exploring: the context in which the problem exists, relevant stakeholders, and any established assumptions.

Northumbria Police were not familiar with the creative nature of the session and therefore the space was curated in order to make it interactive and engaging, rather than static and hostile. For example, the team strategically removed all seating from the room with the aim that attendees would be spending their time 'doing'. Desks were dressed with large sheets of paper and various co-creation resources such as multi-coloured marker pens, sticky notes, and chess pieces (to indicate hierarchy) were provided. Tea, coffee and lots of chocolate fuelled the creative thinking.

In order to better understand the problem space, generative participatory techniques were used to facilitate conversations, capture insights and enable participants' discourse and reflection. The structure was intentionally open and Northumbria Police were asked to identify a pertinent cybercrime scenario and describe how the event unfolded. Using a derivation of a service mapping exercise, participants co-created a process/experience map that visually articulated current issues and challenges in digital policing practices, answering why, how and what was going on Figure 3.

Figure 3. A snapshot of co-creation activity during a creative problem definition session with the problem-owners

It became apparent that cybercrimes can be perpetrated from anywhere in the world and are, therefore, difficult to solve. This resulted in Northumbria Police's focus being on prevention to explore how best to educate the public about how to better protect themselves online? Northumbria Police felt that their previous efforts in educating the public had been largely unsuccessful and therefore it was clear that innovative approaches were required. The 'swamp of data' (Spencer et al., 2017) that resulted from the mapping exercise was filtered into actionable issues which revealed three interconnected 'cybercrime' challenges:

1. Raising public awareness about cybersecurity: Northumbria Police has found that citizens and businesses do not follow data safeguarding advice resulting in avoidable cybercrime.
2. Enhancing trust between the public and the police: This could be done by improving public understanding of digital policing practices and processes, e.g. by communicating the complexity of cybercrime and improving victim's experiences during cases.
3. Internal culture: Different practices and attitudes within traditional and digital policing creates tensions which result in slow and inaccurate responses to cybercrimes.

After the first creative problem-framing session, the team proposed an initial project plan that was agreed with Northumbria Police. The project, entitled 'Cybercrime: Public Awareness and Behaviour', was launched and involved Northumbria Police, CFNE partners and NU academics. The project aimed to develop early stage concepts or solution opportunities. This would be achieved through preparatory design work during a series of co-creation problem-framing and definition sessions with diverse stakeholders. Solution opportunities would then be developed into working prototypes by CDIT businesses. To support this preparatory work, the team engaged six postgraduate students in Multidisciplinary Innovation (MDI) as catalytic agents for new thinking. MDI students[2] contributed diverse backgrounds to the project including industrial design, textiles, economics and business management.

3.1.3 C: What's out there?

After being briefed on the project the students were asked to familiarise themselves with the problem-space. To document and reflect upon their secondary research the students used a variation of a dynamic stakeholder mapping tool (Knowles & Spencer, 2016). This stage lasted one week and resulted in initial assumptions regarding common cyber-vulnerabilities (e.g. 'trusting or unsuspecting', 'uneducated or unaware', 'lazy or unconcerned') and two key cybercrime types, grooming and fraud. Based upon these assumptions, the students produced a 'scenario generator', a tool that included a set of creative props representing social media platforms, users and behaviours. This tool would be used during the briefing session with Northumbria Police to help them generate cybercrime scenarios for further exploration.

3.1.4 D: Brief++

The team and the students hosted a 2-hour session attended by Northumbria Police representatives, student participants, and NU academics. During the first 30 minutes, Northumbria Police outlined key cybersecurity issues and behaviours. This was followed by a creative workshop run by students using their 'scenario generator'. Attendees were divided into two teams with each including a Northumbria Police representative. The physical space had been prepared with long paper sheets, sticky notes, multi-coloured pens, and the 'scenario generator' props (Figure 4). The session was semi-structured in that there was some guided activities. Two short videos created by students introduced grooming and fraud, the two cybercrime types previously chosen to explore. What was key to this session was that the students had the creative confidence to expose incomplete knowledge and ideas to Northumbria Police experts and academics in a highly engaging and playful

[2] Multidisciplinary Innovation students are referred to as 'the students' whilst other students engaged in the project as participants are referred to as 'student participants'.

manner. This helped the students to understand, early on, that their assumptions about the problem-space were incomplete, simultaneously eliciting new knowledge from the experts.

Figure 4. Example of the co-creation props used in the 'Scenario Generator' tool during the Brief++ activity

3.1.5 E: Bring in the experts

The students conducted 24 one-to-one interviews and sent questionnaires to experts from industry, government and academia over the 12-week project. Analysis revealed significant insights into the behaviours and motivations associated with victims and criminals. Moreover, the students were able to identify existing cybersecurity initiatives. Key points from each interview were dynamically mapped (Figure 5) and used to update earlier versions of the map created during activity 'C'. More critically, through data analysis, students identified groups that were a high-risk of cybercrime (e.g. teenagers and older people) and key players in cyber-education (e.g. teachers and parents). Additionally, it was noted that different types of cybercrime effect different demographics. The complexity and diversity of cybercrimes means they cannot be tackled by just one solution. Sufficiency of relevant education practices was questionable and advice around actions to cybercrime prevention was unclear. The conflicting nature of the attitudes and behaviours collected from experts with different backgrounds were themed and labelled as 'creative tensions'.

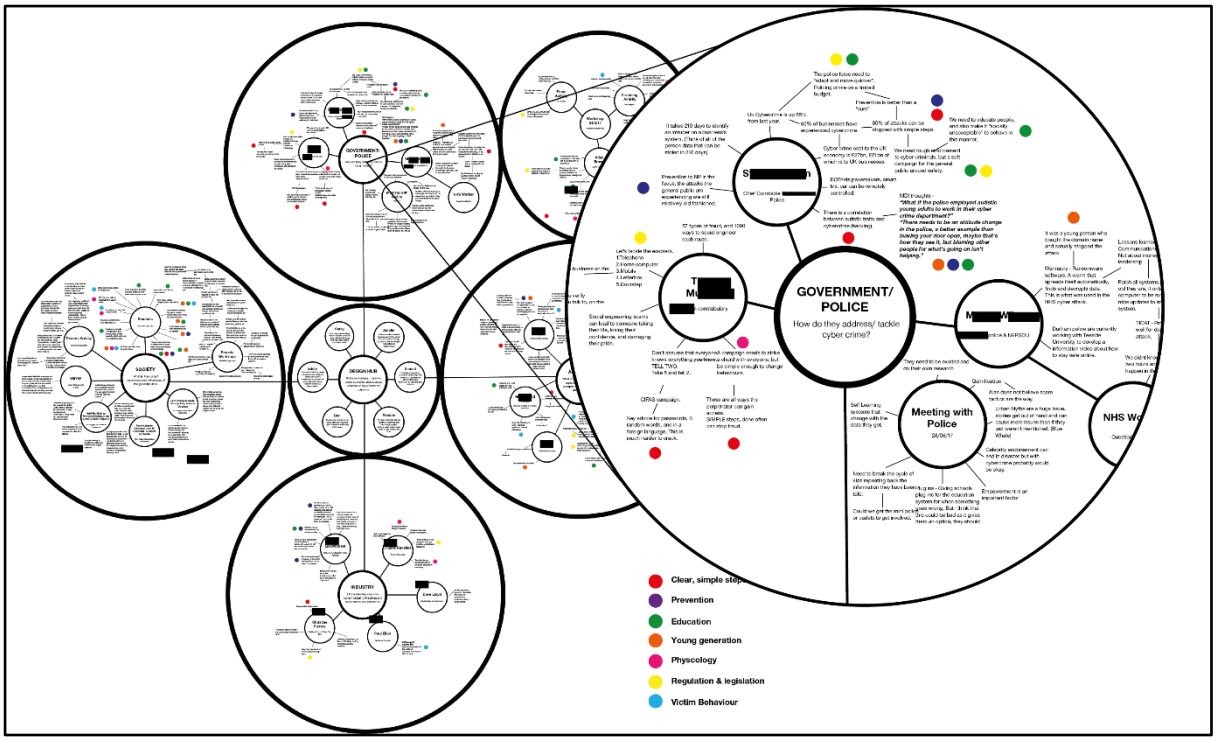

Figure 5. Example of the dynamic stakeholder map created by students to visualise the evolving network of experts engaged during the project

3.1.6 F: Co-creating with 300 teens

Through the network they had established, the students had an opportunity to lead a workshop at a regional high school, with young people, one of the identified high-risk citizen groups. The team designed and developed six design-led activities aimed at gaining a deeper understanding of the young people's experiences of interacting with digital devices. These activities encouraged participants to adopt different roles including advising others on cyber-security ('advice worksheets'), forming positions as if they were an adult ('act the adult' activity), evaluating current educational practices ('education debate'), reflecting on their use of social media ('social media' activity), exploring what is ethical and legal ('ethical vs legal' activity) and drawing scenarios to describe perceived cybercrimes ('comic strip' activity) (Figure 6).

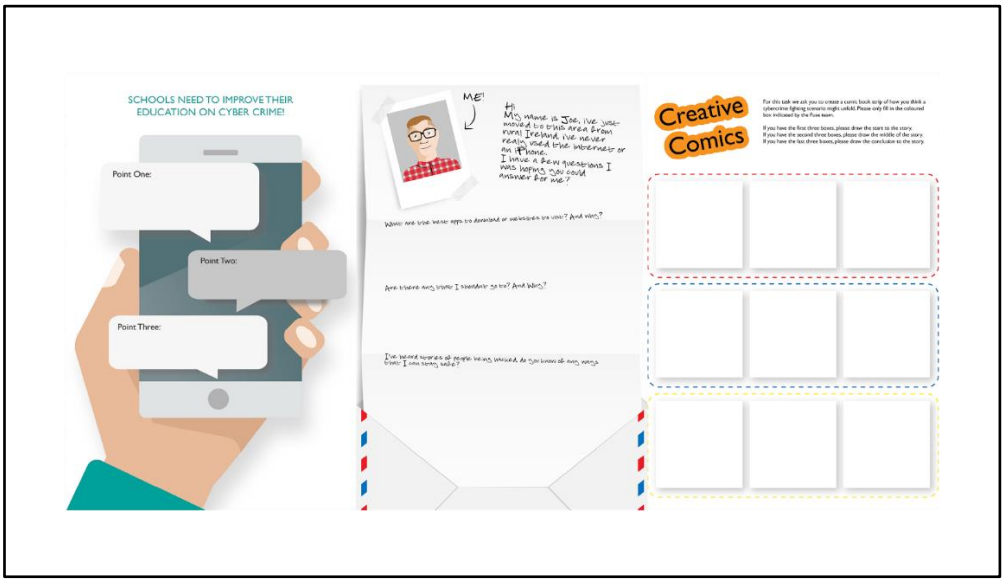

Figure 6. Examples of creative materials designed to engage teenagers in several co-creation activities around behaviours and attitudes in cybercrime

The students engaged with around 300 teenagers during the day and generated significant insights into the attitudes and behaviours of young people, and the challenges surrounding cyber-education (Figure 7 & 8). Findings regarding teenager's use of social media and digital platforms included: their 'overdependence' on them as a result of peer-pressure and fear of missing out; the ways that friendship fallouts or bullying can be amplified through them; and criminal or hurtful behaviour not being perceived as 'real' when enacted over the internet. Significantly, the findings pointed to a shared consensus amongst teenagers and the various experts interviewed in the earlier phases that cybercrime education in schools is not sufficient. For example, these are focused predominantly on traditional grooming, 'stranger danger' and the sharing of indecent images, but very little about much else, such as cyber-bullying, grooming through online games, password protection, privacy settings, and ID theft.

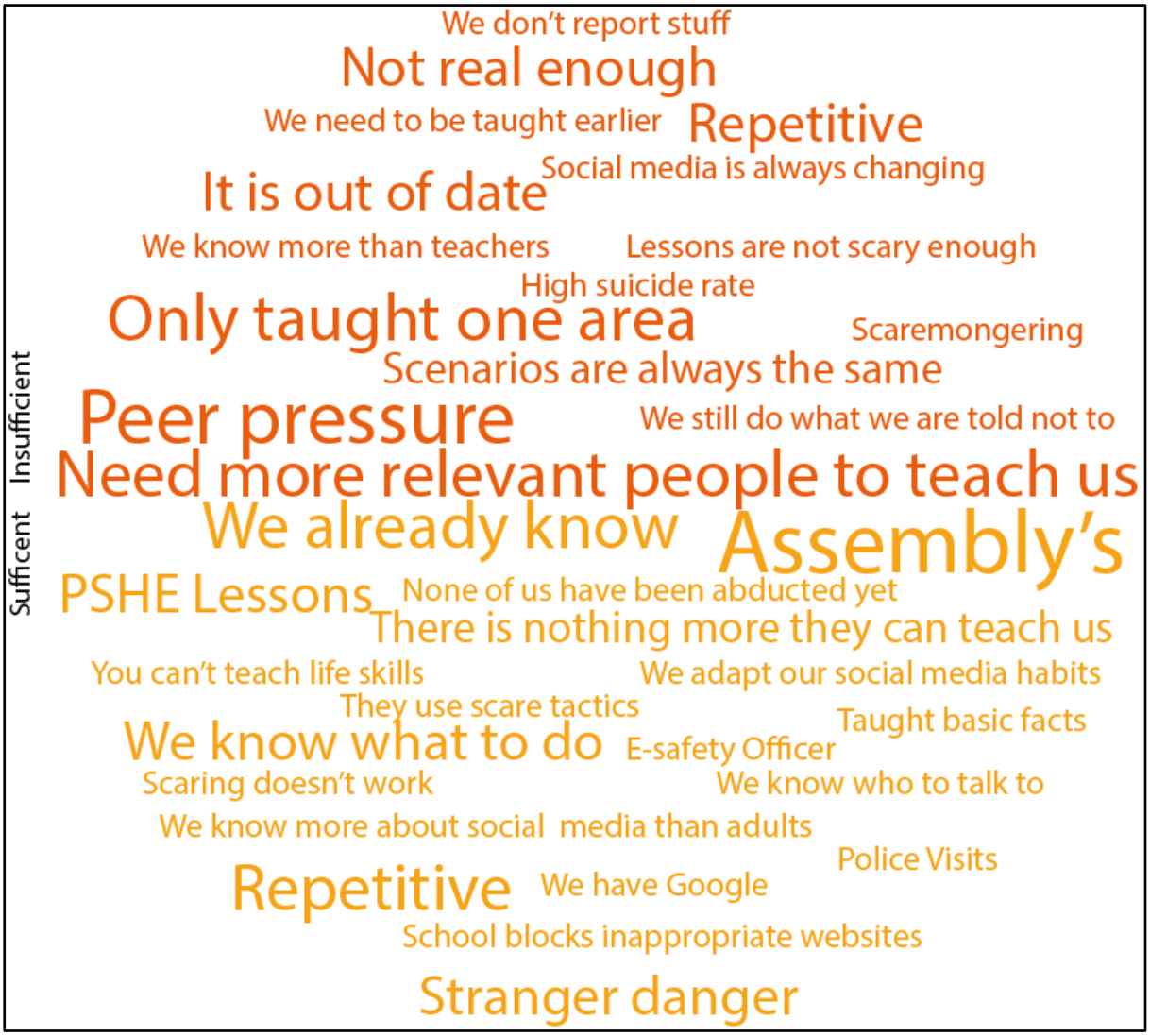

Figure 7. A word cloud capturing diverse points of view about sufficiency VS insufficiency of current cyber-education in schools

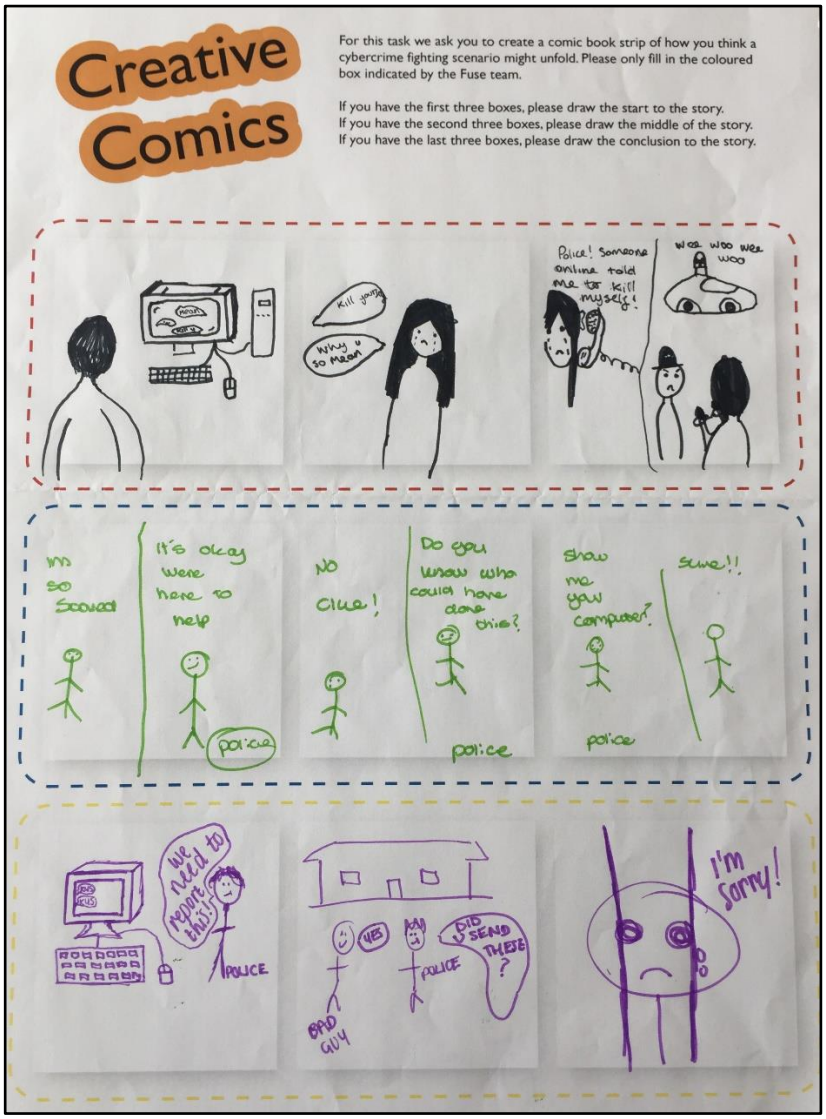

Figure 8. Example of a perceived cybercrime scenario drawn by a teenager

3.1.7 G: Check in and check out

The students met with the team at the midpoint of their 12-week involvement with the project to reflect on their findings and create a future direction for the project. Findings about young people seemed to stand out as both the most prolific and raise the most powerful challenges. The team chose to focus on young people as a demographic where raising awareness and changing behaviours could have the greatest long-term impact. The team and the students also decided to consider early stage ideas and opportunities to address the challenges associated with that age group. This meeting acted as a catalyst for the remainder of the project as it brought clarity and an impactful direction.

3.1.8 H: Bring in the parents

Having decided to focus on teenagers, the students sought to gain further insights from the perspective of parents. They organised a 2-hour workshop with parents of young people to investigate how parents educate their children around cyber-safety (Figure 9). Although low attendance at the workshop affected the breadth of perspectives, it instead resulted in detailed data. Findings suggested that parents differ regarding the level of independence online and safeguarding advice they give their children. Notably, parents of people in their twenties said that they had provided little guidance, as they themselves were not brought up with computers and the internet. In order to gain a wider perspective, students used insights from the workshop to compile an online questionnaire which was then sent out to parents and guardians. Analysis of the 20

responses revealed parents found it difficult to discuss cybercrime with their children and there was an expectation that children's cyber education should be a shared responsibility between parents, schools, government and industry. Findings from the parent-focused research activities and the school workshop were dynamically mapped and themed to reveal new 'creative tensions'.

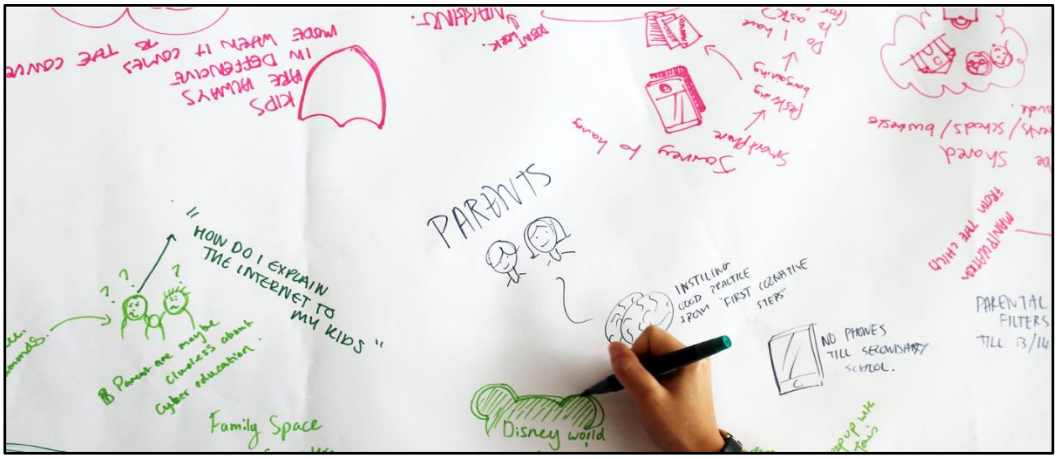

Figure 9. A snapshot of the co-creation workshop with parents

3.1.9 I and K: Stimulating provocations

As mentioned, one of the key project goals was to conduct preparatory design work to form positions (briefs) and stimulus material and to co-create early stage proposals and solution opportunities with small CDIT businesses, student participants, academics and Northumbria Police staff. To inform a future open innovation event (titled 'Solution Hack' and discussed below), the students needed to translate the breadth of knowledge generated through preparatory work into provocations, labelled as 'creative tensions', building on those already identified. To trial the running of this event and explore how the creative stimulus materials would fuel it, a process of trialling and refining took place at two pilot events.

Firstly, the team was invited by another Creative Fuse North East partner to co-lead a 12-hour workshop (Creative Stimuli (1)) which involved diverse academics, businesses and experts in intense ideation and development of physical prototypes/solutions using the partner organisation's 'FabLab' space, including 3D printers and other machinery, in response to a set of challenges. The students devised four provocative briefs, informed by their previous research, around digital behaviours and also acted as creative facilitators during the event. Members of the team and the students facilitated the workshop and produced a series of actions to work through along with several design-led tools. These resulted in each of the four groups creating 'provotypes' (Boel & Dorovan, 2012), i.e. provocative concepts and prototypes (see e.g. Figure 10). This workshop had a high impact on the project as it provided first-hand experience of running a 12-hour workshop thereby informing the design of future ones.

The procedural and thematic knowledge gained from the 'Creative Stimuli (1)' event informed the design of a second pilot co-creation event, called here 'Creative Stimuli (2)' (Figure 11). This day-long event was essentially the culmination of the students work over the past two months and its fundamental purpose was to apply their findings and pilot their ideas and tools for the 'Solution Hack' event. It was also a chance to create and develop some initial solution opportunities relating to the problem-area. 17 participants drawn from the network of experts the students established in earlier phases of the project, attended the day which resulted in 18 idea cards, synthesised to 11 for further development from which 6 were further refined and 3 made it to the final pitch and presentation stage. A number of observations in relation to the participants' behaviours during the event (e.g. a tendency of choosing the easiest to make ideas when it comes to development and pitching) and in the day's structure (e.g. long breaks impact on momentum and the importance of

making clear when different sessions start and finish) were recorded and many of the initial recommendations in the design of the forthcoming 'Solution Hack' event were altered as a result.

Figure 10. Example of a 'provotype' developed during at 12-hour workshop. The 'Digital Condom' is a concept for a marketing campaign that encourages teenagers to practice good cyber-hygiene, in the same way people take care of their personal hygiene

Figure 11. A snapshot from the second 'Creative Stimuli' co-creation workshop

3.1.10 J: Visions of a public cyber-wellbeing campaign

The rich insights gathered from the school workshops really inspired the team. An early idea that derived from this inspiration was about creating a campaign that would target different demographics through creative events in local venues across the region in order to interact directly with the public and provide cyber education in a fun and playful way. An opportunity was established to engage with a regional museum to explore how they could become a pioneer in teaching this dynamic topic to local school children in new innovative ways. A co-creation workshop with key staff from a local museum was run by the students which initially sought to create a 'shared understanding' of both the project's context and the museum's purpose. It was found that, whilst the museum has an excellent permanent collection and has run many family-oriented programmes, there remains clear opportunity to engage with digital innovation. The students then introduced five themes that their research suggested an educational plan ought to cover: passwords; privacy settings; virtual versus reality; protect devices; and online threats. Ideation around these themes focused on the possibilities that a new educational program could provide. A number of fun and engaging activities were identified during the workshop focusing on helping young people learn through play. After the workshop, the students further developed the ideas and created a set of 20 activity recommendations (Figure 12) that the museum could implement as school sessions, family events, or permanent fixtures around the venue. The team is currently looking to materialise these activities in the coming year.

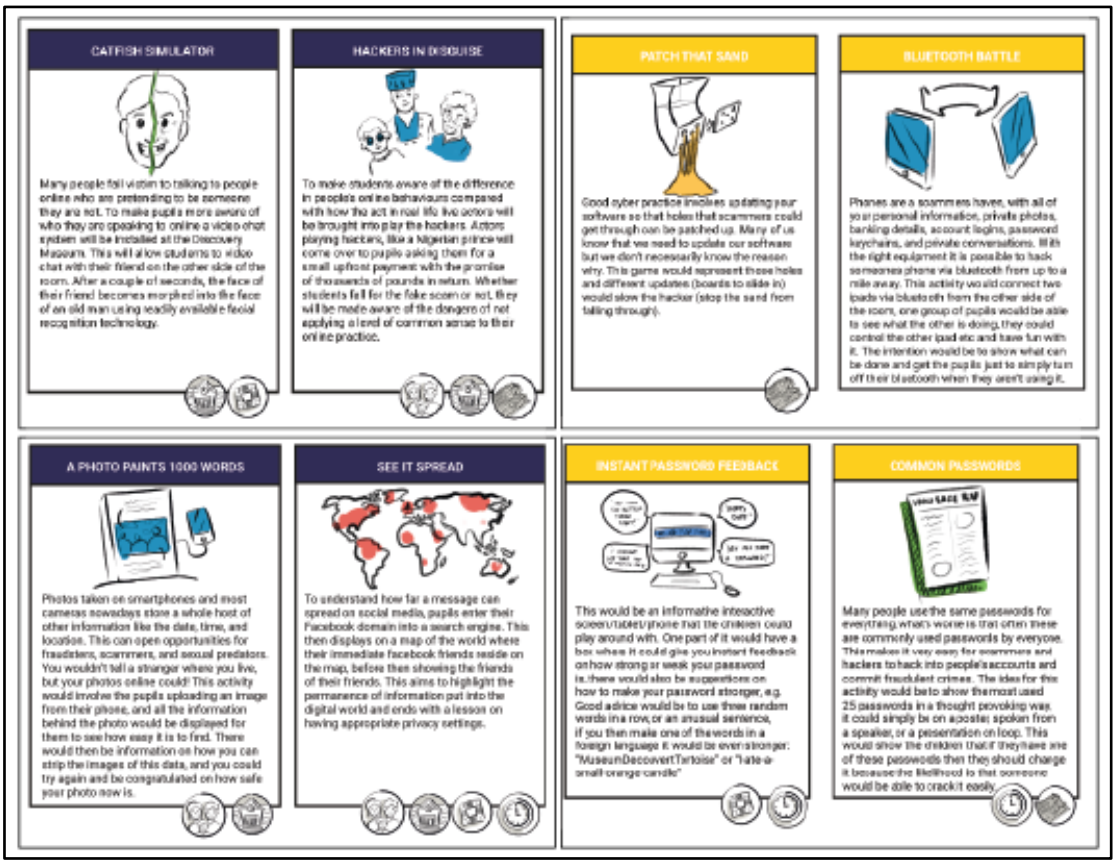

Figure 12. Examples of early stage ideas and solution proposals for a cyber-education campaign to publicly engage teens and parents

3.1.11 L: Solution Hack

The team designed a 'Solution Hack', a 12-hour open innovation event that brought together 30 participants from business, Northumbria Police, student participants and members of the public. A creative planning event was held by the team, using the same co-creative, generative, creative approaches that they deploy with external partners. It was in this session that the team resolved

planning the Solution Hack's agenda and created the 6 briefs, aligning and enhancing the creative tensions, including the notion of Attitude-Behaviour-Vulnerability that were central to the event's choreography.

The purpose of the Solution Hack event was to engage CDIT SMEs and Northumbria Police to generate solutions to some of the current challenges posed by poor cybersecurity amongst teenagers. The objective was to have developed a series of actionable solution proposals. To achieve this, the team used expertise in inclusive design-led innovation approaches to encourage the sharing of knowledge, skills, experience, expertise and opinions and combine these to create new ideas or build on existing ones. The event used the creative tensions previously designed to highlight conflicting perspectives about particular teen attitudes, behaviours and cyber-vulnerability. This, and a package of supporting materials (Figure 13), formed the brief: *Achieving teen cyber-wellbeing; How can we raise awareness and influence behaviour change to address cybercrime vulnerability*?

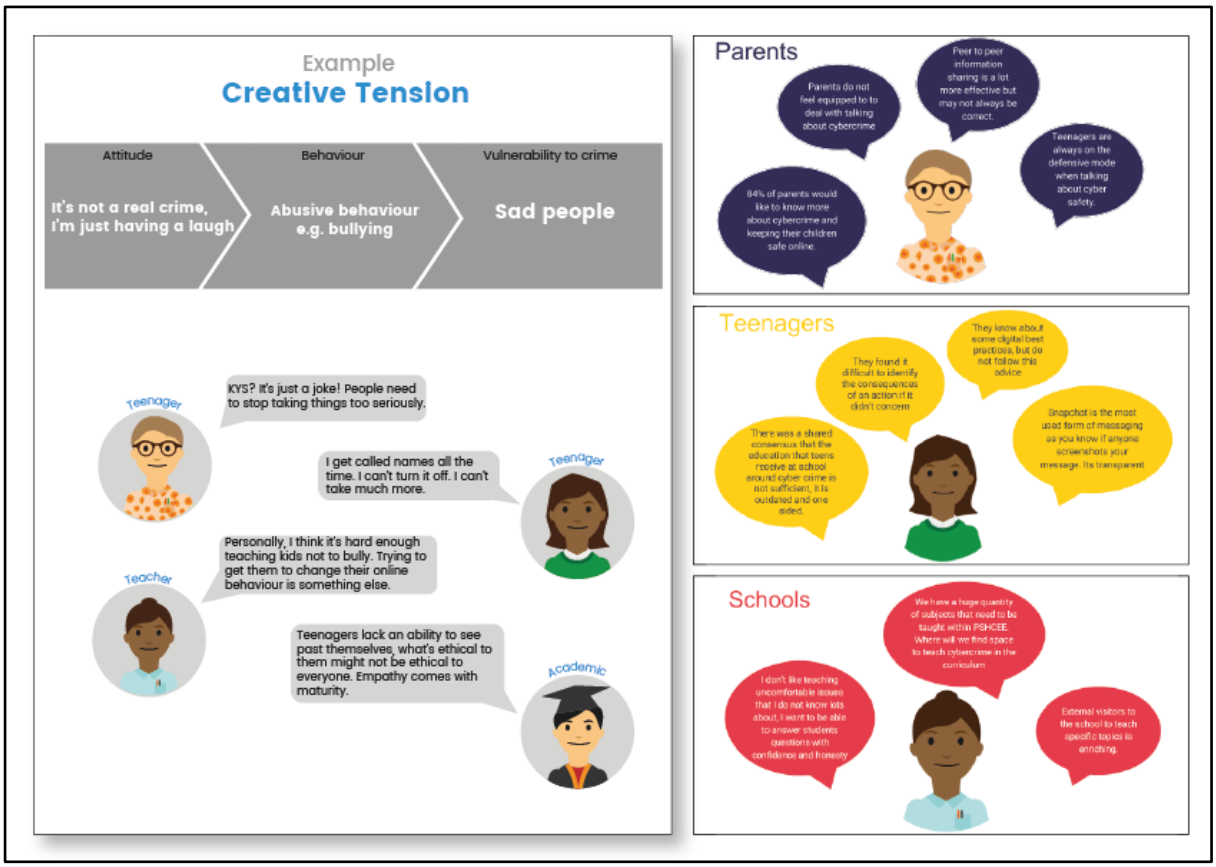

Figure 13. Examples of stimulus materials drawn from the team's research findings, provided to teams to describe the context and drive creative thinking amongst participants

In the morning, five teams from mixed backgrounds worked together to generate 80 ideas in response to their briefs. For the afternoon session attendees formed two teams; each individual from each team selected those ideas that they felt had potential for development. Prompted by sets of challenges (Figure 14) that aimed to guide the development of ideas, and informed by feedback from police representatives, each team constructed and pitched a solution proposal. One of the proposals presented a concept for an integrated cyber-education programme that saw students acting as cyber-ambassadors, seeking to promote 'authentic' peer learning delivered by students, rather than the teachers. The second proposal was a framework for exploring digital ethics, through actions and consequences. The framework, aligned to primary school age groups, built a portfolio of exciting and engaging activities allowing young people, their peers, teachers, family and carers to blend digital and physical interactions, communications and encounters to try to understand the very real ethical and potentially dangerous consequences of certain digital behaviours.

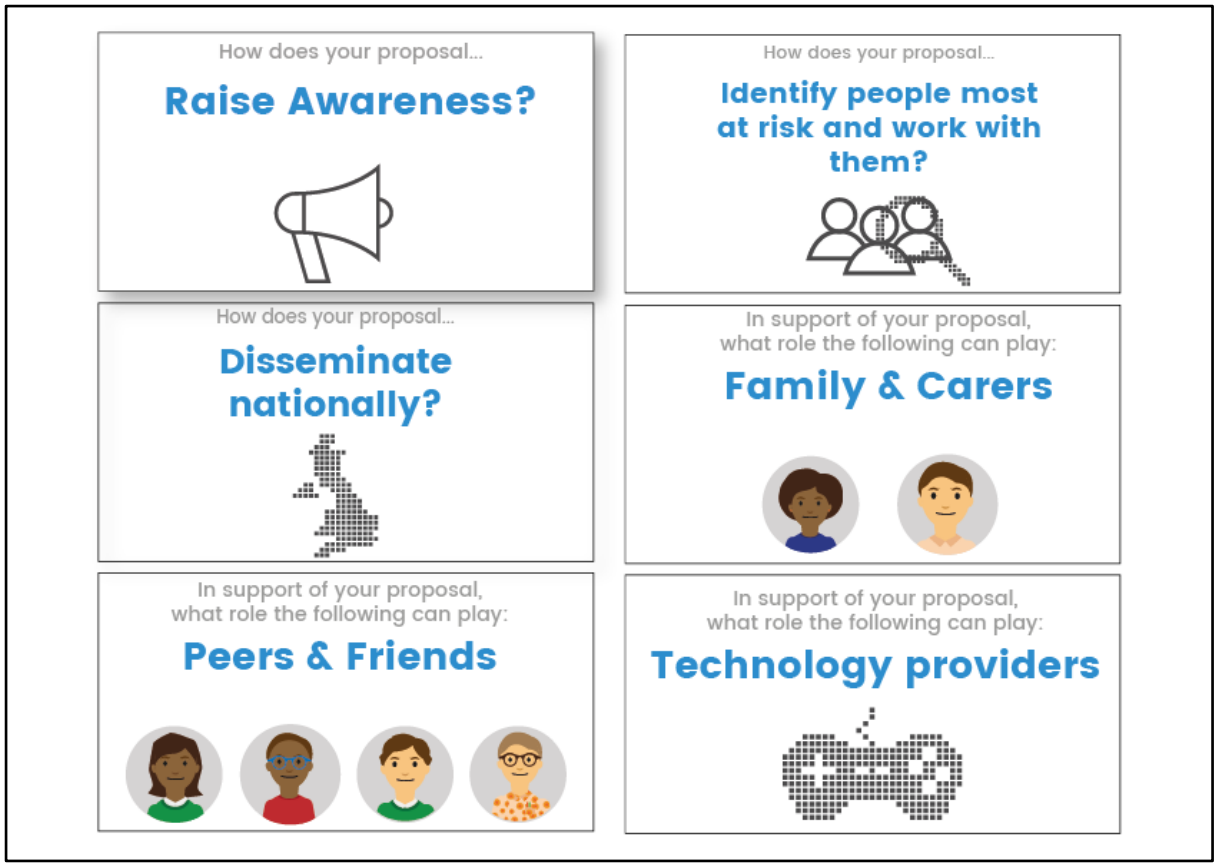

Figure 14. Design prompt cards were presented to each team during ideas development to inspire a multidimensional perspective to their proposal

The event created value to both attendees and Northumbria Police representatives; the former gained from being exposed to a pressing social challenge; experiencing a novel approach to problem solving; and by working with a range of new people from different professional and social backgrounds with different levels of experience and expertise. Northumbria Police reported that the event allowed them to work with a University in a new way, through an approach that generated ideas for future initiatives and actions;

> *Working creatively, with a range of experts, to generate solutions was tremendously exciting. If we can execute and deliver some of these ideas, they will catch on like wildfire, there is such potential to make a difference. (Senior Northumbria Police member)*

Throughout the 12 project phases, Northumbria University's Creative Fuse North East team have produced a set of actionable design briefs targeting specific value areas with sufficient clarity to commission delivery partners. Northumbria Police also commented that some of the solution proposals had the potential to scale nationally. Currently, the team is investigating the means and mechanism through which this development can occur. The team have gained a further case study about the value and application of inclusive design-led innovation practice and plan to continue to work with Northumbria Police to seek funding to see proposals emerging from the event through to pilot implementation.

4 Findings

Over the 12 phases of the project, the team arrived at two key convergent points, a) framing problem spaces and themes (activities A-H), b) early stage actionable solution opportunities that were used both for stimulating creative thinking and as strategies for developing solutions (activities

I-L). The project is currently in this 'strategy development' phase. Figure 15 depicts the range of enablers employed throughout the different phases of the projects and their points of convergence.

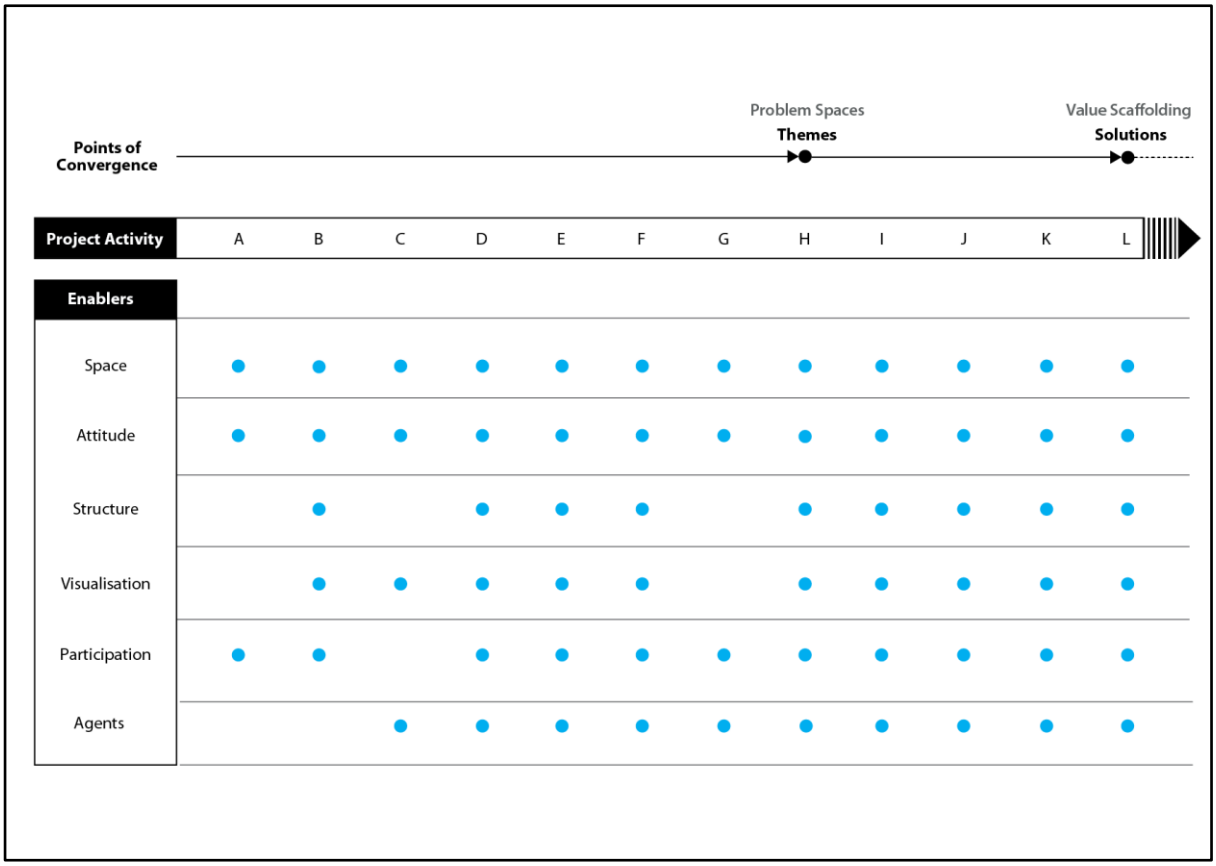

Figure 15. The different NU's design-led enablers employed during the 12 project phases

While it can be seen as though almost all enablers were present across the majority of the project phases, upon closer investigation, the intensity with which Northumbria University's design-led enablers influenced each phase's outcomes (hence, the project itself) varied. Where these enablers are referred to in the text they have been capitalised in order to highlight them.

For example, in activity D ('Brief++'), the 'participation' enabler was deficient; only a few Northumbria Police representatives made it to the session due to a security incident which demanded their attention. This in effect had an impact on the 'structure' enabler as the planned creative activities were devised with more expert participants in mind. Moreover, this deficiency affected the project by slowing down one important early stage objective: establishing and engaging expertise in the process.

During activity E ('Bring in the Experts') the students engaged with experts across industry, society, government, and academia all of whom contributed their knowledge. However, only some of the experts converted into activists (in that they actively participated in co-creation activity), thereby missing the opportunity of deeper engagement in subsequent events. Enablers such as being open to a changing 'structure' meant that students were able to identify that collecting teacher's perspectives would be beneficial, and to adapt their plans to include one-to-one conversations with teachers on a later date. In the same way, the flexibility of the 'Structure' enabler allowed students to compensate for the deficit of parents during Activity H ('Bring in the parents') by a) making the most of the opportunity by collecting in-depth data and b) devising other means to enable more diversity (i.e. questionnaires).

In activity I ('Creative Stimuli (1)), the team had little to no control over the environment and participants as these were managed by the partner institution. However, as the event took place at a

'FabLab', it helped foster a mindset of 'making' and 'experimentation'. To compensate for a lack of control, enablers such as 'structure' ranging from the creation of 'briefs' prior to the event, to the role of the team and the students had in facilitating the day were important, while the 'visualisation' tools and the 'attitude' enablers provided a set of fun and engaging activities.

Deficits were also observed in enablers 'structure', 'visualisation', and 'participation' during activity K ('Creative Stimuli (2)). For example, momentum was negatively impacted due to the lack of a well-planned 'Structure' in the day and the unclear start/finish points during different activities. This highlights the importance of balancing structure and flexibility. Moreover, participants were not obliged to stay for the whole day which caused disruption to the composition of teams and no proactive mechanisms were in place to anticipate this. On the other hand, the 'visualisation' enabler while consisting of a wealth of tools and creative stimuli, it was questionable whether their 'abundance' fostered a better engagement or whether they disrupted or overwhelmed participants. The lack of Northumbria Police expertise and lower engagement from academics of partner institutions (partly because of not turning enough 'experts' into 'activists') had a detrimental effect on the day's outcomes.

Finally, in activity L ('Solution Hack') the team identified two enabler deficits, 'visualisation' and 'participation'. In the former enabler, creative materials (provocations and tensions) it was observed that some participants treated them as 'descriptions of cybercrime' rather than 'context for action', thereby dismissing them in order to pursue solutions based on their personal experience (rather than based on the supplied research). In terms of the 'participation' enabler, this event fell short with achieving engagement with the Creative, Digital and IT SMEs. However, in contrast to activity K discussed earlier, the open to change 'structure' had anticipated the disruption caused when participants stayed only for part of the day and successfully enabled a non-disrupted event. Figure 16 depicts these varying densities between the enablers during the different project phases.

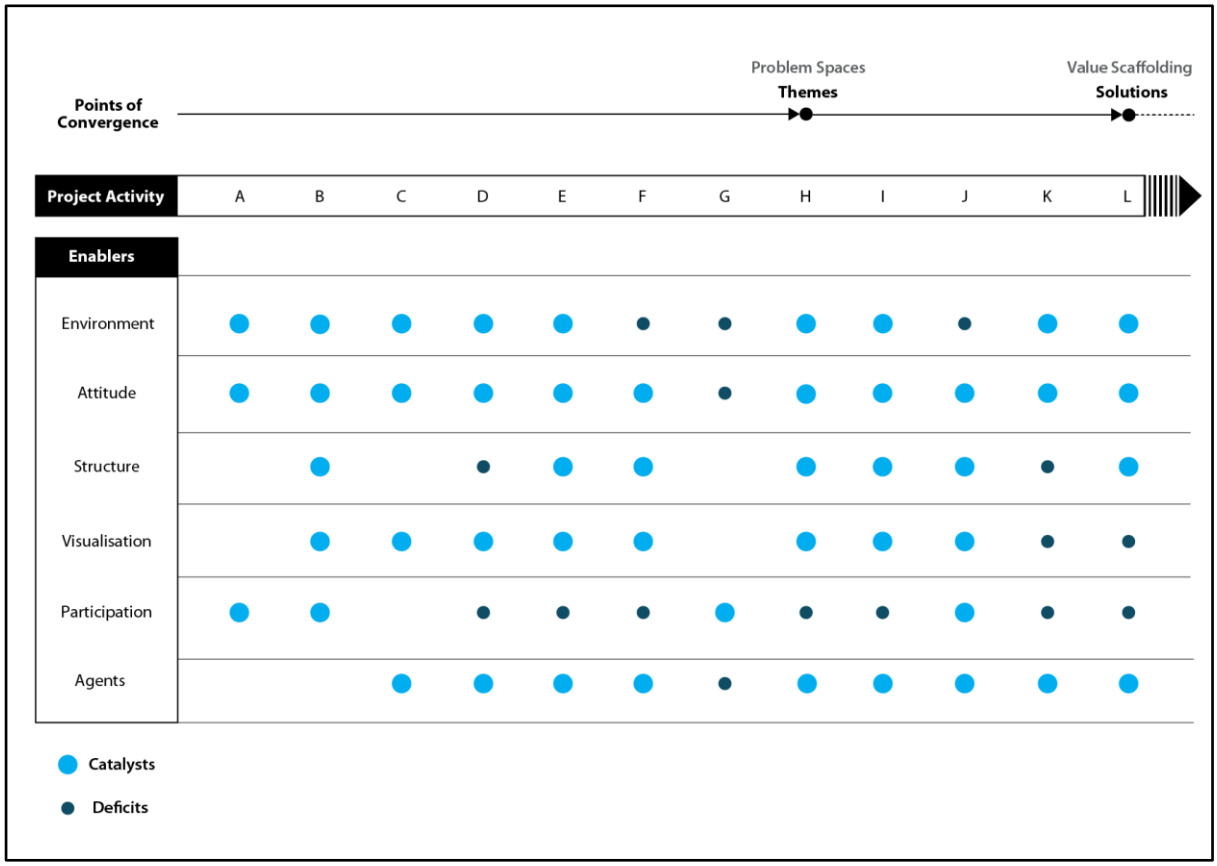

Figure 16. An illustration of how different enablers influenced project outcomes during the different phases. Larger diameter circles indicate greater density and importance, while the smaller indicate a deficit

5 Conclusions

The case study discussed in this paper described Northumbria University's design-led approach to tackle a complex, ill-defined and ambiguous problem: cybercrime. This approach was applied in this instance during the 'problem framing' stage of the project in order to transform the complex problem into actionable briefs and solution opportunities. To reach solution opportunities, we (re)framed and transformed the wicked problem into a design problem by collecting knowledge, asking pertinent questions, and generating speculative ideas. Such problem-transformation can be found in the way the problem was eventually framed; from 'cybercrime' to 'cyber-wellbeing' and from 'prevention' to 'raising awareness and influencing behaviour change to address cybercrime vulnerability'. Activities such as; engaging with diverse expertise across industry, academia, society, and government; identifying and engaging with high-risk citizen groups; trialling creative materials in pilot co-creation events; and a series of creative planning events, were amongst the most valuable in problem-framing. This framing was achieved through a process that needed careful facilitation to bring people together around a common purpose and foster their creativity. This paper proposed 6 enablers (space, attitude, structure, visualisation, participation, and agents) that were deployed to move from a position of ambiguity to one where there are strategic and actionable solution opportunities.

The evidence presented in this paper therefore suggests that amongst the 6 enablers, the 'participation' enabler is the hardest one to achieve. For example, questions that the team will seek to address in future projects are: How to convert 'experts' to 'activists' so that they are not only sharing tacit knowledge but actively co-creating new knowledge and solutions? How to incentivise and attract business engagement when there is no direct and/or immediate reward for them other than the opportunity to work with a range of new people from different professional and social backgrounds, learn new ways of working and which may (or may not) lead to forging new partnerships or developing innovative solutions? Northumbria's design-led strategy to tackle 'participation' deficits is through another enabler, 'structure'; having a highly adaptable structure enabled the team proactively to anticipate and reform in response to changing circumstances throughout the project.

Finally, it was observed that the 'agents' enabler, represented in this project by a group of multidisciplinary students, gave 'professionals' permission to behave creatively and ask naive questions through their 'creative naivety'. This had an amplifying effect upon every other enabler, making them a crucial ingredient in Northumbria's design-led approach to business-engaged research and innovation.

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Determinant Moments for the Design Management Occurrence in Fashion Industry

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Design management has occupied a privileged place in debates related to the field of design and innovation in fashion industry. The apparel industry, in particular, presents a dynamic character, requiring constant updates on raw materials, changes in colours and textures, innovations and new product launches to follow trends in this industry. It becomes clear the need to understand design as a strategic element as well as using the design management in organizations. Therefore, this paper aims to systematize the process of product development, identifying the players and their competencies involved and mapping the determinant moments for the design management occurrence in context analysis. The methodology used was a systematic literature review and a multiple case study. As results, players involved have been identified as well the product development process and the intervenient factors in design management of companies imbricated in the apparel industry. We also have identified determinant moments for the occurrence of design management, throughout the product development process.

design management; product development process; teamwork; decision making

1 Introduction

Many organizations direct their financial resources to products, services and research development in order to create and innovate, differentiating their portfolios from its competitors. In this way, these organizations have been showing interest in investing in design, perceiving it as a vehicle for change and a strong ally for innovation. However, for achieve the expected return on investment and for design to be a vehicle for change, design needs to be seen as a strategic element, and to be understood as a process. Design is part of the objectives of the companies, being thought in the initial phase of the development of strategies, guidelines and portfolio management, permeating all levels of the company activities. With this, in addition to the other organization activities, the company starts to carry out the activity of design management. Borja de Mozota (2003, p.71)

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defines design management as “the implementation of design as a formal program of activity within a corporation by communicating the relevance of design to long-term corporate goals and coordinating design resources at all levels of corporate activity to achieve the objectives of the corporation.”

However, in order to design integrates the organizational environment and be part of the company's goals, these organizations know who the players and coworkers are involved in the product development process. In addition, organizations need to define what competencies are required at each stage of the product development process to better articulate their actors in an efficient and effective way, aiming at the optimization of their resources. The garment industry, in particular, has many actors involved throughout the product development process, with different competencies and expertise. In this way, design management can help organizations: communicate the relevance of design, empower design as a vehicle for change, and also coordinate design resources at all levels of organizational activities. Borja de Mozota (2003) emphasizes that design management has two main goals: to form partners-managers and designers and to develop methods to integrate design in the organizational environment.

Thus, this article aims to systematize the process of product development, identifying players and their competencies involved and mapping the determinant moments for the design management occurrence in context analysis. Thus, the question presented here is: what are the determinant moments in the product development process for the design management to occur and to foster design as a vehicle for change, who are involved and what are their competencies in this process?

2 Literature Review

Constantly, ways to systematize and understand the design management in companies are developed. Portuguese Design Centre - PDC (1997) starts the process of development of design projects by the stage called as recognition or impulse, described as the right time to act, that is, the recognition of potential opportunities. The next stage is the analysis. This step is strongly related to the previous one because, starting from the opportunity identified, a strategy can be drawn towards the solution. The third phase is the definition/decision, where the product in an elemental form is defined in relation to the company and its market. The exploration phase consists in learning how to make the product to be developed. The fifth step is the selection, where after the evaluation of all options developed, one is chosen. The development phase refers to detailing what will be effectively developed. Later, there is a stricter detailing, in the phase of specification. Lastly, there is the phase for launching the product in the market.

Other model addressed is the one from Bruce et al. (1999), entitled framework for design management, which exposes a sequence of steps for the design management to occur. The first step is called taking action, where the design manager creates the initial concept of the project. The second moment is evaluating the concept followed by their development. Next, there is the research made by the designer. The briefing and their validation form the following moments. Subsequently, there are the stages called mock up and mock-ups (reworked and re-evaluated), which present the moments from the development to the prototype validation. After the initial version of the developed prototype, it is thought, experimented, evaluated, remade, and re-evaluated until the final approval. After the step of experimental production, next comes the total production of the products. After the step of the production, there are the launching promotion and the evaluation of the launching of the products in the market. Once the process is concluded, there is step of removing the product from the market.

Focusing on the apparel industry, the literature presents the models by Treptow (2007), McKelvey and Munslow (2008) and Renfrew and Renfrew (2009). Treptow (2007) mentions the phase for planning, which consists in the initial step of the author's proposition. In the next phase, there is the elaboration of the collection's timetable, followed by the definition of the parameters and dimension (size) of the collection. The fifth step consists in researching trends. Subsequently, the

briefing and the concept of the collection are defined. The development is the next step of the process, concerning the moments of inspiration, study of colours, fabrics and trimmings, drawings, modelling, prototyping, technical specifications, sale price definition, and development of showcase. Next, there is the step of launching and release, followed by sale and production. Afterwards, the deliveries are prepared until the last step, which consists in feedback meeting.

McKelvey and Munslow (2008) suggest that this process comes from the analysis of the brief, by identifying innovative opportunities. From this analysis, two researches can be carried out: inspiration research and direction research. The inspiration research refers to the concepts and personal inspirations. The direction research refers to the prediction of fashion and trends, comparative and directional reports from the retail, reports from fairs, and market researches. These two researches move to the following step, which is the process of the very design. This process includes the definition of colours, silhouettes, proportions, fabric, impressions, patterns, textures, samples, and assembly. The prototyping is the next step, which is the flat cut, patterning, modelling, structuring and defining the adornments and accessories. Next, the collection is defined, where the garments and accessories are put together for a decision to be made. Promotion is the final step, when the advertising pieces, the photographic style, and the creation of the portfolio of the collection are defined.

According to Renfrew and Renfrew (2009), the process begins by researching the market. Second, the consumer is identified, followed by research and development. Third, the following steps are included: briefing for the prototyping team, final costs, and production requests. Next, there is stage of presenting the collection, which consists in preparing the fashion show, the show itself, after the show, in reviewing the applications, in confirming the products for delivery, and defining the final costs. The authors highlight that the process is not finite and, when the last step is finished, it begins again. However, by observing the models listed previously, gaps are seen in different steps of each model.

3 Research Methods

The present study conducted a bibliographic research by developing a systematic review of literature as well as an exploratory research with a qualitative approach while using in-depth interviews. These research techniques were important to define the determinant moment for the design management to occur in apparel industry companies. Next, the steps of the methodology used in this study are described.

3.1 Performance of the systematic literature review

Firstly, a systematic literature review was applied, whose goals of exploratory character were developed, aiming to identify connections and interrelationships among the topics of design management, players and their competencies. The following methodologies were adopted: Anderson et al. (2003), Alderson et al. (2004) and Biolchini et al. (2007) for the sequence of the methodological steps, as it is shown in Table 1.

The systematic literature review was done in scientific papers in portals such as: Science Direct, Web of Knowledge, and Wiley to search for articles, by using the keywords ‘design management’ and ‘competenc*’. Articles published in periodicals addressing competences and their relationships with design management were researched. The period used for the search comprised the journal articles published until the end of 2015. 1172 articles were collected in specific portals, but only 38 studies were selected. 1134 studies were discarded because the comprehensiveness of meanings of the word design (draw, project or methodology). For example, the word ‘design’ is often used in the term ‘design research’, referring to methodological construction. Bibliographies of these studies were analyzed, identifying the existence of another study. From this, 39 articles discussing this topic were selected. The articles selected were read in full, and information was tabled and analysed.

Table 1 Steps of the systematic review of the literature.

Anderson et al. (2003)	Alderson et al. (2004)	Biolchini et al. (2007)
1) Develop a conceptual framework to organize, group, and select the research; 2) Systematic research, data recovery; 3) Evaluate the quality and summarize the effectiveness of the evidence; 4) Summarize information on other evidence (applicability, economy, other effects and barriers to implementation); 5) Identify and summarize the research gaps.	1) Develop a protocol; 2) Formulate the problem; 3) Find and select studies for the review; 4) Assess the quality of the studies; 5) Collect data; 6) Analyse and present the results; 7) Interpret the results; 8) Improve and update the reviews.	1) Ask the question; 2) Select the sources; 3) Select the studies; 4) Extracts of the information; 5) Results.

Source: Adapted from Anderson et al. (2003), Alderson et al. (2004), Biolchini et al. (2007).

This procedure mapped the current state of the topic addressed here, as well as the understanding of design management related to the individual, collective, and organizational competences. With this analysis, concepts related to design management and competencies also emerged, such as: learning, skills, resources, knowledge, value, interactions, communication, collaboration, market context, organizational culture, organizational structure, work processes, and stakeholders involved.

3.2 Proposition of the determinant moments for the design management to occur

In a second moment, a research exploratory, qualitative was developed (Malhotra, 2012), by studying multiple cases and proposing in-depth interviews. By using two semi-structured scripts, interviews were conducted with four experts in fashion design and ten design professionals working in the apparel industry companies in Southern Brazil. The sample was limited to 14 respondents because of the recurrence of data of the interviews. Regarding the qualitative research, Malhotra (2012) states that this is a non-structured, exploratory research methodology, made from small samples, enabling a better perception and understanding of the problem at hand. The results of the interviews were analysed using the content analysis approach (Bardin, 2005). Therefore, a product development process based on design management was analysed, identifying the actor and their competencies involved in each step of the process. The findings of the research also pointed to identify the determinant moment for the design management to occur and to foster design as a vehicle for change, in apparel industry companies.

3.3 Checking, evaluation, and finalization of the determinant moments for the design management to occur in apparel industry companies

In order to check the proposition of the decisive moments of design management, a group of experts was assembled, which was composed of three designers working in companies belonging to the apparel industry and two experts in fashion design. The interviews with five experts were recorded and transcribed. The data were tabled and analysed by using content analysis approach (Bardin, 2005). A direct approach was used in the interviews, and the data were obtained through primary sources. To ensure the anonymity of the five respondents, they are identified in this study as interviewee 1 (I1), interviewee 2 (I2), interviewee 3 (I3), interviewee 4 (I4), and interviewee 5 (I5).

Throughout the interviews, the proposition of the decisive movements was presented to the experts, and they were free to analyse, criticize, and suggest changes and/or propose new ideas in order to verify the structure and evaluate the applicability of this tool. After the interviews were concluded, the data were analysed and considered to change and finally assemble the proposition of the determinant moments.

4 Proposition

To prepare this proposition, we started from a systematic review of literature on design management and skills were performed to the search in the literature for design management models (specific of the apparel industry), and a qualitative research with four experts and ten design professionals. From the analyses carried out, the following were developed: a comparative table with the models found in the literature that were applicable to the study, a drawing of the process of development of the product resulting from the multi-case study, and the identification of key stakeholders in each stage of this process. The analyses of the data from bibliographical research and the in-depth interviews made it possible also to identify the decisive moments for the design management to occur throughout this process.

4.1 Systematic literature review

Thirty-nine articles dealing with the topic of design management and skills were selected, which enabled the mapping of the current scenario of research on skills in design management, highlighting inter-relations and possible connections between the topics and other aspects identified.

The study identified an overview of the articles analysed, while evidencing an advance in the publication over time and locating the research centres about the addressed topic over the world. It is clear a larger number of publications about this topic in 2005 and 2007 and a concentration of research centres in Europe.

An analysis of the links between design management competencies and the identification of concepts related to competencies that can help in structuring and integrating design teams and their partners about the occurrence and development of design management in enterprises have been developed. It appeared that the competencies strongly pervade the concept of design management and when articulated, they can assist in structuring and integrating design teams and partners involved in the design management.

The studies selected address essential, individual, collective, organizational, central, collaborative, and strategic competencies, as well as the characterization, creation, development, performance, management, allocation, and connections of those. From the analysis of the collected studies, it could be concluded also that these competencies occur at the individual, collective, and organizational level and when articulated to design management, they collaborate to achieve sustainable competitive advantage of the organizations.

Other aspects related to the competences in design management were also identified, such as: learning, skills, resources, knowledge, value, interactions, communication, collaboration, market context, organizational culture, organizational structure, work processes, and stakeholders involved. These concepts present relationships and enable connections and articulations with the competences in the design management.

4.2 Models from the literature

The design management models identified in this research (PDC, 1997; Bruce et al., 1999; Treptow, 2007; Mckelvey; Munslow, 2008; Renfrew; Renfrew, 2009) can be applied to the apparel industry companies. These models were arranged in Table 2, in such a way that the phases and/or steps correspond to each other.

Table 2 Comparative of development process in apparel product.

CPD (1997)	Bruce et al. (1999)	Treptow (2007)	McKelvey and Munslow (2008)	Renfrew and Renfrew (2009)	Adaptation proposed by the author	
- Recognition or impulse	- Taking action	-	- Briefing analysis (opportunities to innovate)	- Market research	- Creation of Guidelines	Organizational Strategies and Research/Monitoring of the Environment
- Analysis	- Evaluation of the concept	- Planning and Schedule	Inspiration Research and Direction Research	- Identification of the consumer	- Trend research	
- Definition/ decision	- Briefing - Validation of the briefing	- Briefing - Concept of the collection - Development	- Design process	- Research and development	- Creation of the collection	
- Exploration - Selection	- Mock up - Mock-ups (re-worked and re-evaluated)	-	- Prototyping	-	- Production of the template piece	
	- Experimental production	- Launching and release	-	-	- Launching and release	
- Development - Specification	- Total production	- Sales and production	-	-	- Production of the collection - Revision and quality control	
- Launching of the product	- Promotion of launching	- Deliveries	- Selected pieces for the collection - Promotion	- Presentation of the collection	- Distribution in the retail outlets and/or to representatives	
-	- Evaluation of the launching - Removal of the product from the market	- Feedback meeting	-	-	- Market monitoring	

Source: Adapted from CPD (1997), Bruce et al. (1999), Treptow (2007), McKelvey and Munslow (2008), Renfrew and Renfrew (2009).

4.3 The process of development of a product of apparel companies and the ones involved

The process of developing apparel pieces, originated from interviews with experts, starts with the guidelines of the collection being created and these guidelines being aligned with the company's strategies. It is noteworthy that designers have to be embedded with the perception of design understood as a value by the company. Bruce et al. (1999) state that designers need information about the projects, as market data, specificities of production, prices, planning, and deadlines to be met for a better alignment with the initial briefing.

From the definition of the guidelines for the new collection and the products, there is the research stage of trends going from the monitoring of the market, the creation of the collection, production of the template pieces, production of the collection, revision and quality control, and distribution of products to the monitoring of consumer satisfaction by the company.

Afterwards, once the productions and distribution of the apparel is concluded, the client will give a feedback, which will be a useful tool for the creators (Borja de Mozota, 2003). These creators often as a stylist director or even as a design manager follow three collections simultaneously. The collections fall/winter, spring/summer, and high summer demand this professional to follow three collections in parallel, by monitoring the market's acceptance of the products from the current collection, the production of template pieces to the collection that will come in the following season, and trend research for the collection that will come subsequently. According to Vincent-Ricard (2008), the final product, i.e., the clothing, also presents the particularity of being a consumer object that needs the two-year period to be finalized, from the textile fibber to the provision in the market. However, according to the author, this product is renewed every six months, with constant regularity, presenting a planned obsolescence.

Importantly, according to the adaptation proposed by the author, there is the participation of someone responsible for the design, either the designer or the stylist or the director of the style department, on the steps of the process of development of products reported by the interviewees. It should be noted also that each step requires data, information, and competencies that require the involvement of different individuals, teams, sectors, and raw material and / or services suppliers, as shown in Figure 1, thus comprising multidisciplinary teams.

The presence of a design professional at every stage, whether the stylist or the designer or a director of style, it is necessary to follow-up and monitor the piece throughout the product process of development, having direct or indirect action. Kotler and Rath (1984) corroborate this claim and emphasize that designers participate in all stages of products' development, while interacting with all the areas involved in a particular project. In the definition of the design management, Avendaño (2003) stresses the importance of integrating the different participating agents in the design management and advocates the active participation of designers and others involved in the decisions of products.

This design professional will work directly on the initial steps of creating the design strategies and guidelines for a new collection, on the trend research, and on the creation of the collection. In line with the relevance of the early stages of a project, Kotler and Rath (1984) emphasize that a common and recurrent error in companies is the late entry of designers in a process of development of a new product, or the wrong choice of the type of professional to work in this design stage.

The design professional will also follow the making of the template piece, the production of the collection (modelling, production, monitoring of suppliers), and the final revision and quality control of the pieces produced. This professional will be responsible for transmitting the mood, that is, the concept of the collection to the commercial representatives, sellers, managers, and other individuals working in the retail outlet. The design professional also interact with the other stakeholders who are responsible for each of the productive steps. In the final stage of market monitoring, the design professional goes to the point of sale and monitor social networks or other means for research and feedback, to check the acceptance by the consumers regarding the part produced.

Dinsmore and Silveira Neto (2007) list as the main professionals involved and managed in a project: project manager, responsible by the project, sponsors, clients, project team, functional groups, and outsources. Along with them, in the apparel industry, the suppliers as external agents are found. The complex management of this chain of apparel industry suppliers as well as the exchange of information and knowledge with these agents is characterized by the large number of people involved and therefore requires great flexibility and adaptability to meet the constant market demands. This outsourcing of production is a reflection of a market dynamics and results from a strategy that provides greater flexibility and agility in the manufacturing processes, consolidating production networks in a single organization.

Steps of the process of development of products, such as modelling, part of the production, and distribution can be automatized. However, while the advance in technology has proved an ally to

increase production, determining stages of the manufacturing process are still performed manually, as it is the case of embroiders or seamstresses in the manufacture of the template parts. According to Brazilian Association of Textile and Clothing Industry - ABIT (2010), this sector, regardless of the technological advances, is still intensive when it comes to work labour. Some companies remove one seamstress from the production line when the template pieces are elaborated. These seamstresses have tacit knowledge that hardly becomes explicit, because there are no records of information or knowledge coming from them. According to Nonaka (1991), tacit knowledge refers to the technical abilities, such as informal and hard-to-be specified skill, that is, the "know-how." The author exemplifies that artisans develop a specific skill in their fingertips, being incapable to explicit the technical principles related to their skill. Other companies have a practice to transfer knowledge and consequent learning among the seamstresses of production lines in their plants, while transforming existing tacit knowledge into new tacit knowledge. Thus and while corroborating the statement by Capaldo (2007), it is shown the relevance of the encouragement to the organizational routines of sharing knowledge.

Phases and Activities of the Design Professionals/Agents Involved	Executive Director	Product Dev. Director	Style Director	Marketing Director	Planning Director	Purchase Director	Production Director	ROM Manager	Production Manager	Quality Manager	Stylist/designer	Purchase Team	Marketing Team	Modelist	Template Maker	Seamstress	Suppliers	Faction Supervisor	Storeowners	Sellers	Window dresser	Comm. Representative
Creation of Guidelines and Trend Research																						
Retrieve information from market monitoring on the previous collection		■	■	■	■	■		■			■	■										
Define guidelines and design strategies	■		■		■						■											
Plan the offer/supply	■	■	■	■	■	■	■	■				■										
Define the concept of the new collection		■	■	■																		
Identify trends			■		■						■		■									
Retrieve information from the databasis from previous collections											■		■									
Generate alternatives											■											
Define concepts			■								■		■									
Define raw material					■	■					■	■	■				■					
Creation of the Collection																						
Develop the Collection			■								■	■										
Make technical drawing											■											
Create technical file with specifications											■	■										
Production of the template piece																						
Create consumption record											■	■										
Implement modeling											■			■								
Implement the template pieces											■				■							
Meet with everyone involved in the project to validate the collection	■	■	■	■	■	■	■	■	■	■	■	■	■		■							
Revision and improvements		■							■		■											
Production of the Collection, Revision, Quality Control and Distribution																						
Supervise the production and revision									■		■							■				
Store information in databases											■	■	■									
Make/participate in lectures with representatives and/or sellers in retail outlets			■					■			■		■						■	■	■	■
Make launching events			■					■			■		■						■			■
Market monitoring																						
Follow sales indicators and customer satisfaction	■	■	■	■	■			■			■		■						■	■		■
Go to retail outlets to check the consumers getting to know the products			■		■			■			■								■	■		■

Figure 1 Phases and activities regarding the product to develop apparel pieces and the main involved in the design management of the companies of this industry

4.4 The determinant moments throughout the process of development of apparel products

Considering the highlighted topics, the proposition of moments in the process of development of a product determining the design management to occur. Aiming to achieve a differentiation in their products to achieve a sustainable competitive advantage, the apparel industry companies look at the steps of this process, such as:

1. The initial step for defining the strategies and guidelines and for creating the concept for the new collection (Determinant Moment 1 – DM1);
2. The step for researching and identifying trends and grouping of teams with different specializations to discuss and validate the collection (Determinant Moment 2 – DM2);

3. The moment for defining the template pieces to validate and start the production of the collection as well as the registration of drawings and technical files (Determinant Moment 3 – DM3);
4. The step of transmitting the mood, that is, the concept of the new collection to the managers, sellers, and store owners in retail outlets, as well as commercial representatives (Determinant Moment 4 – DM4);
5. The market monitoring by both the data analysis and indicators and by direct contact with consumers in retail outlets or in virtual contacts (Determinant Moment 5 - DM5);
6. Moments of creation, exchange, and retention of essential data and information, as well as moments of creation, development, and retention of individual, collective, and organizational competences (DM1, DM2, DM3, DM4, and DM5).

Figure 2 shows determinant moments for the design management to occur and to foster design as a vehicle for change in the process of development of a product of the apparel industry companies.

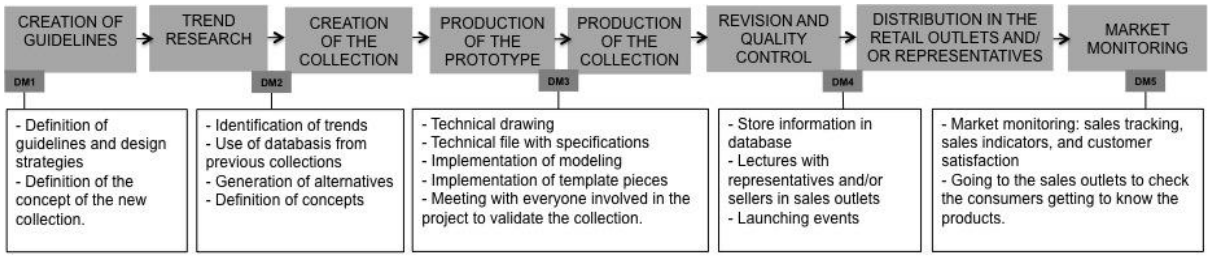

Figure 2 Determinant moments for the design management to occur and actions from this design professional, before the validation from the experts

4.5 The determinant moments after the validation from the experts

Regarding the structure of the process of development of products, as illustrated in Figure 2, the interviewees in general understood that it was suitable to the apparel industry and aligned to the dynamics of this market. Nevertheless, it was suggested to insert the step of launching and disseminating in this process, soon after all involved approved the template pieces of the collection. I2 highlighted that "the preparation occurs between the definition of the template pieces and launching and release of the collection in the market." Moreover, the professional mentioned that the time for preparing this material is short and this is why it has to be carefully programmed. The task of communicating and promoting the new collection to the commercial representatives and storeowners happens before their distribution to these agents. However, I4 mentioned, "launching and release can be anticipated to a previous step for major clients, who despite being in small number, strongly impact the collection sales." Therefore, inserting this step in the process of development of products is considered relevant and pertinent.

The comment about inserting the step for launching and releasing the collection led to the proposition of one more determinant moment. The moment inserted was placed between the definition of the template pieces and launching and release of the collection into the market. One action of the design professional related in this determinant moment is the storage of information in databases because of the approval and completion of the template pieces. These updated databases determine how well the collection is doing, whether to provide information to the involved in the process or as a collective memory of the teams and the organization. Other two actions referring to this moment are connected to the following step (launching and release of the collection): lectures with representatives and/or sellers in the retail outlets, and promotional launching events (fashion runways and/or media, such as radio, TV, social networks, and the company's website).

Therefore, determinant moments for the design management and action of the design professional to occur, after checking and evaluation of experts, are shown in Figure 3 and can be listed as follows:

1. In the initial moment, related to the definition of strategies and guidelines for the concept of the new collection, data and information from the market monitoring performed in the end of the process of the previous collection have to be recovered. Guidelines and design strategies that are aligned to the organizational strategy, culture, and company's values are also defined. Thus, it will be possible to define the planning of the offer and the concept of the new collection, both aligned to the design strategies (Determinant Moment 1 – DM1);
2. After researching trends and consulting the database system of the previously developed collections, alternatives are generated and concepts and raw materials are defined to be used for developing the new collection (Determinant Moment 2 – DM2);
3. Once the concept and the collection drawings are created, it is the time to detail this creation to produce the template pieces. Technical drawings, data sheet with specifications, consumption record, preparation to make the template piece, and modelling it are made (Determinant Moment 3 – DM3);
4. The moment for grouping the teams with different expertise for discussion and collection validation is also considered a major step towards the design management (Determinant Moment 4 – DM4);
5. The stage for launching the collection happens through promotional material but also the transmission of the mood, that is, the concept of the new collection to the managers, sellers, and shopkeepers in retail outlets, as well as to commercial representatives. At this time, information that still must be put in the system should also be stored, in order to have a complete data basis, since the details are already closed and the collection is already being put to production (Defining Moment 5 – DM5);
6. The final moment is the market monitoring by both the data analysis and indicators and by direct contact with consumers in retail outlets or in virtual contacts, mapping the acceptance of the products on the market (Determinant Moment 6 – DM6);
7. Moments of creation, exchange, and retention of essential data and information, as well as moments of creation, development, and retention of individual, collective, and organizational competences (DM1, DM2, DM3, DM4, DM5, and DM6).

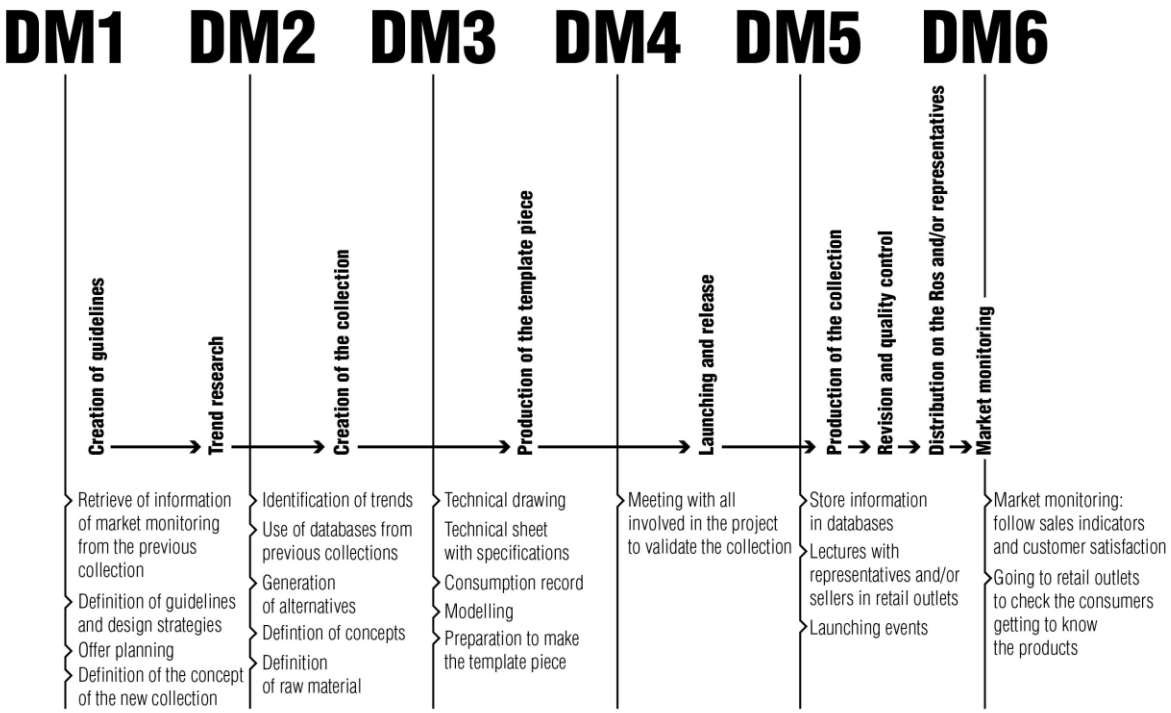

Figure 3 Determinant moments for the design management to occur and action of the design professional

5 Conclusions and suggestions for future research

Thus, this article aims to systematize the process of product development, identifying the players and their competencies involved and mapping the determinant moments for the design management occurrence in context analysis. In the design management of clothing companies, the creation and the occurrence of specific knowledge and information of this sector is clearly perceived, be it from individual practices and routines or from the integration of work teams. Internal arrangements, work routines, and a systematic of processes could help in mapping these occurrences, so that it is possible to manage the activities and resources (tangible and intangible) involved in design management.

Some organizational implications can be mentioned, as a result of determinant moments implementation in the occurrence of design management, such as: the employees' desire to remain with routines and practices already established and rooted in organizations, the conflict between stakeholders and the possible costs increase in the short term due to raising activities and trainings of employees to perform these new activities. However, these implications are supposed to be addressed and settled by managers and directors.

Therefore, it is noteworthy the relevance of identifying determinant moments for the occurrence of design management as well as the ones involved in each step. It will be possible to evaluate the efficiency of the competencies for the design management to occur and to foster design as a vehicle for change. One limitation of this study lies in the fact that sometimes, the product development process has several steps and timelines occurring simultaneously, and that require multiple overlaps of time and events. This research also presents the application of limitation in a heterogeneous sample of companies inserted in the apparel sector, in terms of size, structure and service to the market. For future research, we suggest to conduct a study using a larger sample of companies, or in companies in other regions of Brazil.

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Do Professionals with Different Backgrounds Use Distinct Thinking Styles When Designing a Product?

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A thinking style refers to a person's preferred way to process and react to different situations. Since they have an impact on performance and should be viewed as fluid, some environments may benefit from specific thinking styles to optimize results and the use of resources. In this paper we present a study indicating which thinking style professionals with different backgrounds (engineers, designers, and architects) favour when designing a product. For that, we used the Concept Design Thinking Style Inventory (CD-TSI). Results showed that engineers favour the *conditional* thinking style (accepting opinions from others without questioning them), designers prefer the *exploring* style (seeking for options and differentiation), while both designers and architects lean towards the *creative* style (thinking in parts to get to the whole concept). Contributions in this study are threefold. First, we associate thinking styles to groups of professionals. Second, we discuss them in relation to decision-making processes (rationality and intuition). Third, we associate them to product design stages.

Keywords: design thinking styles; product design; decision-making; concept design thinking style inventory.

1 Introduction

Product design is a time-consuming, resource demanding activity, which may be performed in a variety of ways according to the desired result (Tortorella, Marodin, Fetterman, & Fogliatto, 2016). Aligning thinking styles of those involved in the design activity with the intended goal is key to optimize the use of both material and human resources in the process of product development. A previous research due to Rosa, Brust-Renck, and Tonetto (2016) used the Rational-Experiential Inventory (REI) questionnaire to evaluate differences in the product design decision-making process across professionals from different backgrounds; namely, designers, engineers, and architects. The study indicates that those professionals may adopt one of two approaches for decision-making in

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their projects: intuition and rationality. While intuition is emotion-driven and configures in a faster, automatic decision system, rationality is logical and operates through rules of reasoning, not being directly influenced by emotions or personal preferences (Kahneman, 2003). In a design project, the decision-making approach identifies professionals that rely more on both past experiences (intuition[1]) and the ability to reason about a theme (rationality). Two questions remain: (i) what makes one rely on intuition or rationality, and (ii) are there other more sensitive styles that define how product designers think.

In this paper we extend the research in Rosa et al. (2016). While still focusing on the decision-making process of architects, designers, and engineers, we investigate five thinking styles that these professionals may favor when performing different tasks in a designing process; they are: *conditional*, *inquiring*, *exploring*, *independent*, and *creative*. Thinking styles are explored using the Concept Design Thinking Style Inventory (CD-TSI) (Volpentesta, Ammirato, & Sofo, 2009), which define three aspects of the product design process and behaviours of those involved in it (in addition to the five thinking styles mentioned above); namely: (i) stages of a design process, (ii) approach of designers to collaboration, and (iii) personal way of designing.

Since a designer's profession is usually associated with intuition (Tonetto & Tamminen, 2015), we test the hypothesis that when designers engage in product development, the *exploring* and *creative* thinking styles will be predominant if compared to other professionals (i.e. architects and engineers), who may be more rational and might relate more to other thinking styles. Testing our main hypothesis we were able to attain a secondary objective, which is to gain knowledge on how engineers and architects make decisions when designing a product (whether they are more rational and may rely more on *conditional* and *inquiring* styles, for example, or are also relying on intuition and, therefore, more emotion-driven thinking styles). Finally, thinking styles of professionals with different backgrounds are related to stages of the design process.

There are three important contributions in this study. First, we associate thinking styles to groups of professionals. Second, we associate thinking styles to dual process approaches to decision-making, and investigate what are the best styles to tackle inherent uncertainties that arise in each stage of product design. Finally, we associate thinking styles to product design stages, and set guidelines to recruit teams of professionals to perform each phase.

The remaining sections of the paper are organized as follows. In section 2 we review the literature on the five types of design thinking and their association to decision-making process approaches. In section 3 we present our research methods, emphasizing on the CD-TSI questionnaire. Results are presented in section 4, and discussed in section 5. We close the paper with a conclusions section.

2 Design Thinking Styles and Decision-Making

2.1 Thinking Styles

Let us start by properly defining thinking styles and explaining how they may be applied in a design context. According to Sofo (2005), the theory of reality construction describes a thinking style as one's preferred way to interpret the world. It is an individual or shared way to process, acknowledge, and use information. A thinking style may be characterized as a mental strategy – that may be conscious, semi-conscious, or unconscious – to optimize the use of personal resources while dealing with environments (Sofo, 2005).

In life's everyday management, people tend to choose the way that feels more comfortable in terms of thinking styles. Zhang and Sternberg (2005) point out that people may be flexible when choosing those styles. They will most likely align the style with their way of thinking when confronted with particular demands and situations, in search of a favourable outcome (Sternberg & Grigorenko,

[1] In our study, experientiality (Volpentesta, Ammirato & Sofo, 2009) and intuition (Kahneman, 2003) are used as synonyms.

1993). As important as acknowledging that people may have a preferred thinking style is to recognize that it may change or be developed as response to a given environment. Thinking styles should be viewed as fluid (Sternberg, 1997; Zhang & Sternberg, 2005), responding to different contexts and evolving according to one's experiences. No thinking style is better than others; they are just different and may be better suited to specific situations (Sternberg & Grigorenko, 1993).

Thinking styles have impact on performance (Sofo, 2005; Volpentesta, Ammirato, & Sofo, 2009). The benefits of identifying and analysing thinking styles come precisely from the optimization they may promote in the use of one's personal resources, enabling the achievement of goals in a more efficient and effective way when dealing with different contexts and information. Such flexibility in adjusting thinking styles to different environments may lead to intensified success (Sofo, 2005). That corroborates with Sternberg (1997), who states that half of one's performance is determined by her intelligence and ability, while the other half depends on her thinking style preferences.

Sofo (2005) structured a theory of reality in which five styles of thinking are proposed; they are listed in Table 1. Such styles "refer to how a person likes to accept, make sense of, and react to information, people and tasks" (Volpentesta, Ammirato, & Sofo, 2009, p.788). They are also in agreement with a variety of style definitions available in the literature (Volpentesta, Ammirato, & Sofo, 2009; Zhang, 2002; Zhang & Sternberg, 2005).

As people apply thinking styles to every domain of life, they may affect work performance and the use of intellectual and creative abilities (Sofo, 2005). The design domain is of particular interest here. Since thinking styles lead to different ways of dealing with information, the use of one style or another may impact differently on the design process.

Volpentesta, Ammirato, and Sofo (2009) have developed a Concept Design Thinking Style Inventory with five thinking styles. The *conditional* style relies on proven models and solutions, and may be important to ensure convergence in a design process. The *inquiring* style may help designers to gather information from different professionals or sources involved in the project, providing answers to their questionings during the process. The *exploring* style is often associated with innovation, that is, the search for different and alternative solutions that may increase the project's potential of achieving new results. In a different perspective, the *independent* style may lead to a more individualized design process, since the priority is one's own insights and views. Finally, the *creative* style may be associated to the designer's need to envision many different solutions for a task. In this last case, the design process should generate a variety of alternatives enabling the designer to get a sense of the bigger picture.

2.2 Thinking Styles and Decision-Making

Decision-making is a daily challenge that demands complex cognitive processing. Judgment and decision-making are processes that comprise the evaluation (judgment) of available choices and their expected outcomes, as well as the decision itself (Tversky & Kahneman, 1981).

Cognitive psychology has been exploring how people make decisions in real life (Kahneman, 2003). Academics in this field consider the human mind as not purely rational, but bounded in rationality, since people have limitations to process information and make decisions.

Herbert Simon stated that design is an artificial science, since it is aimed at designing artefacts that are not natural to change current life situations (Simon, 1981). According to the author, people make decisions approximately; they evaluate their choices and, when they find an alternative that is close enough to their imagined criteria, they tend to make a decision. All decisions, in this sense, would be partial, biased, limited, and approximate to what is 'good enough', not necessarily excellent.

Simon and other researchers, including Kahneman (2003), have been investigating how the human mind makes decisions, dealing with incomplete information. The information needed to make perfectly informed decisions is not usually available, but people still making choices. In this research context, the concept of bounded rationality was established.

Moving a step further, we analyse Sofo (2005)'s thinking styles in the light of Simon (1981)'s concept of bounded rationality as it applies to decision-making. According to Simon's view, only in trivial situations human beings are able to follow optimization logic and reach the ideal decision (Simon, 1981; Kahneman, 2003). When product designers are faced with real life work situations, they are bounded by the limits of projective instruments, which are unable to compute all possible worlds, and have to settle for a decision within the limits of their own rationality. In other words, in an optimal scenario they would not be able to recognize an optimal solution even if it presented itself in early phases of the product design process, since that would require comparison with all other possible alternatives (Simon, 1981), which are not available given that product designers do not have the tools to generate them all.

Instead, when looking for an (close to) optimal solution, product designers (as decision makers in general) often rely on two types of cognitive processes: intuition and rationality (for a review, see Kahneman, 2013; Stanovich & West, 2000). Research on dual processes of decision-making build on and go beyond Simon's work, suggesting that decisions are driven by either intuition (or experientiality) or rational (deliberative) analysis. According to this traditional view of dual processes, decisions, such as those relevant to product design, may be intuitive – which are fast, automatic, effortless, associative, and charged with emotion – or may be driven by deliberative reasoning, which is a slow, controlled, flexible, and effort-demanding process. Therefore, whereas the intuitive process is responsible for generating first impressions (involuntarily and nonverbally explicit) of perceptions and thoughts, rational processes involve intentional and explicit approaches.

To be intuitive, professionals usually rely on heuristic processes. They are grounded on a principle of attribute substitution: "The essence of attribute substitution is that respondents offer a reasonable answer to a question that they have not been asked. An alternative interpretation that must be considered is that the respondents' judgments reflect their understanding of the question that was posed" (Kahneman, 2003, p.709). Therefore, intuition and heuristic processing may be useful to deal with scenarios of uncertainty that different professionals face in many design problems.

Rosa et al. (2016)'s results using the Rational-Experiential Inventory (REI) questionnaire indicate that engineers are more likely to rely on analytical reasoning (rationality) while architects favour an intuitive approach (experientiality). Designers did not show a significant difference when compared to the other two groups of professionals; on the contrary, their rationality scores were positioned between those of engineers and architects, pointing to a balance between thinking styles, suggesting that they rely both on rationality and experientiality. Someone may deliberately use intuitive thinking in a designing situation in which there is not sufficient time or information to adopt a rational approach (having in mind that, in our exposition, rationality is not viewed as the opposite of intuition).

We now propose an association between the five thinking styles presented earlier and the dual processes of decision-making. Design essentially deals with the proposition of artefacts that not yet exist and solutions to problems not yet solved, and the discipline is usually associated with creativity and innovation (Tonetto & Tamminem, 2015). With that in mind, we propose that *exploring* and *creative* thinking styles could be associated with *intuition*. The same association should also be valid for the *independent* style, since relying on one's own thinking may be connected to well-developed skills, rather than the search for new and usable information. The remaining styles, *inquiring* and *conditional*, indicate a preference towards concrete and proven data, as well as posing questions to gather additional information; those styles could thus be associated with *rationality*.

Tonetto and Tamminem (2015) discuss the role of intuition in the process of designing artefacts that do not yet exist in the physical world. It is not possible to be sure of one's decisions, even when abundant information on the problem at hand is available. Some decisions regarding artefacts that are still abstract cannot be understood from a strictly rational point of view. There is a gap in the design literature concerning the process of moving from an abstract level of experience to the

materialization of artefacts (Camere & Bordegoni, 2015). A level of non-rational processing is implied when translating abstract concepts into concrete projects.

Thus, our study aims at understanding how intuition and rationality work in association with thinking styles, and how we can determine which are more suitable to different product design projects. We also aim at identifying how past experiences play a role in professionals' decision-making and why it is essential for project qualification and assertive decision-making in scenarios of uncertainty, such as product design.

3 Materials and Methods

The research method consisted of an online survey that posed questions from the Concept Design Thinking Style Inventory – CD-TSI (Volpentesta, Ammirato, & Sofo, 2009), in addition to questions about the participants' demographic characteristics. The CD-TSI measures which of the five thinking styles (i.e., *conditional*, *inquiring*, *exploring*, *independent*, and *creative*) different professionals tend to adopt on each stage and task of a product design process. As mentioned in section 2.1, *conditional* thinking means accepting what others think and say without questioning them (e.g. "I tend to readily accept the first plausible option"), *inquiring* means asking questions to improve understanding of message or information (e.g. "I need to follow a question-driven approach"), *exploring* means looking for alternatives and differences (e.g. "I prefer to consider the full range of options"), *independent* means allocating priority to one´s own thinking (e.g. "I rely on my intuition and my problem solving skill"), and *creative* means thinking in pictures to get a sense of the whole (e.g. "I value unusual emotional reactions"). In view of our sample of respondents, the questionnaire aims at revealing how designers, engineers, and architects use styles when designing a product.

The CD-TSI is also organized according to the types of situations typical in product design. The first is associated with the *Stages of a Design Process* and contains four items: (i) searching for a concept vision, (ii) designing product functionality, (iii) designing product shape and geometry, and (iv) searching for a solution to assemble product components. The second is comprised of three items that measure the *Approach of Designers to Collaboration*, or their preference in relying on concrete information or on heuristic and imaginative thinking. The items are: (i) formulating a design problem, (ii) clarifying a design task, and (iii) debating and evaluating ideas/solutions. The third situation is divided in three items concerning with the extend to which designers trust their own impressions or consider other people's acknowledgment and experience; namely, their *Personal Way of Designing*. The items are: (i) retrieving knowledge for a design task, (ii) looking for perspective or use contexts, and (iii) searching for a solution to assemble product components. In each situation, respondents were asked to choose one of five structured responses, which reflect their preferred way of designing and are directly related to Sofo (2005)'s five thinking styles. Prior to providing answers to the questions, respondents were also asked to reflect about their own designing processes.

The study was both descriptive and cross-sectional, with a convenience sampling that was accessed through the researchers' networks and their peers. Respondents who did not graduate in one of the pre-established areas (Design, Engineering, or Architecture) were excluded from the study, as were those graduated in the areas but never involved in projects for creating new products.

Statistical analyses were performed using IBM SPSS Statistics, Version 21.0. Differences in thinking styles were tested using Univariate Analyses of Variance (ANOVAs). Dependent variables were the five thinking styles, compared across professionals' backgrounds (designers, engineers, or architects). Their behaviour within stages of a product's design process, considering the four items listed earlier in this section, was evaluated using contingency tables and Chi-square tests.

4 Results

In this section we present results from applying the CD-TSI questionnaire to a sample of 110 respondents, 42 of which were designers, 34 engineers, and 34 architects. Data from two portions of

the questionnaire are analysed here: the one measuring thinking style preferences of different professionals, and the one exploring the construct Stages of a Design Process, and its corresponding four items.

Table 1 presents means and standard deviations of each thinking style stratified by the academic background of respondents, as well as ANOVA and between group comparison results.

Table 1. Means (and Standard Deviations) of Thinking Styles' Preferences by Professional Background

Style	Design	Architecture	Engineering	Between group comparison
01.Conditional	0.11 (0.11)	0.16 (0.13)	0.26 (0.19)*	$F(107,2) = 10.33$, $p < .001$, $\eta_p^2=0.16$
02. Inquiring	0.27 (0.14)	0.25 (0.21)	0.31 (0.15)	$F(107,2) = 1.09$, $p = .341$, $\eta_p^2 = 0.02$
03. Exploring	0.45 (0.20)*	0.40 (0.20)	0.30 (0.19)	$F(107,2) = 5.09$, $p = .008$, $\eta_p^2 = 0.09$
04. Independent	0.05 (0.10)	0.06 (0.08)	0.07 (0.08)	$F(107,2) = 0.33$, $p = .731$, $\eta_p^2 = 0.01$
05. Creative	0.12 (0.13)*	0.13 (0.10)*	0.06 (0.08)	$F(107,2) = 4.54$, $p = .013$, $\eta_p^2 = 0.08$

* *Significant at 95% confidence level or more*

Results concerning the *conditional* style revealed that engineers displayed higher adoption to such style when compared to architects and designers, which points to their preference in accepting opinions from others without questioning them. Results concerning the *exploring* style also pointed to significant differences between designers and other respondents, suggesting the former displayed a preference towards pursuing alternatives and differentiation; there were no significant differences between architects and engineers. Finally, results showed that designers and architects scored higher than engineers in the *creative* thinking style, indicating that they are more prone to think in parts to get a sense of the whole picture. *Inquiring* and *independent* thinking styles did not yield significant differences between professional with different academic backgrounds; that means such styles are equally favoured across backgrounds.

Table 2 presents Chi-Square tests results and standardized residuals values for the four items in the *Stages of a Design Process* construct, stratified by academic background and thinking style.

There is a significant association between thinking styles and background when professionals are "searching for a concept vision". Answers from designers indicate that they favour the *exploring* thinking style over others, while engineers favour the *inquiring* style at this stage of the design process.
Thinking styles and professional background are also associated when "designing product functionality". Responses indicate that architects adopt more frequently the *exploring* style, designers the *creative* and *exploring* styles, and engineers the *conditional* and *inquiring* styles. Associations between thinking styles and professional background were not statistically significant for items "designing product shape and geometry" and "searching for a solution to assemble product components". In other words, professionals from different backgrounds do not display preferences regarding thinking styles when performing those two stages of the product design process.

5 Discussion

Multidisciplinary efforts are required to develop a product (Ulrich & Eppinger, 2008). Nearly all sectors of an organization are involved in this task, but the design function is the one highlighted in this paper. Design plays a leading role to generate a product that meets consumers' needs, involving knowledge in areas such as engineering design (software, mechanical, electrical, among others) and industrial design (ergonomics, aesthetics, etc.). Professionals that work on this field often go through training in marketing, mechanical engineering, materials science, electrical engineering, and several others. The recruitment of development teams depends on the characteristics of the product to be

designed. Unfortunately, professionals' strengths are often misunderstood, not only regarding their knowledge, but also in reference to their thinking styles. Our research helps clarifying this issue.

Table 2 Chi-Square tests results for Stages of a Design Process construct items, and standardized residuals values

Product design aspect: Searching for a concept vision					
*Background/*Style	Conditional	Creative	Exploring	Independent	Inquiring
Architecture	0.8417	-0.1453	-0.6273	-0.9546	0.6404
Design	-1.6012	1.9052	2.4394*	0.3472	-3.1889
Engineering	0.8417	-1.8577	-1.9373	0.5896	2.7122*
Pearson Chi-Square = 18.021; DF = 8; p-value: 0.021 Likelihood Ratio Chi-Square = 20.630; DF = 8; p-value: 0.008					
Product design aspect: Designing product functionality					
*Background/*Style	Conditional	Creative	Exploring	Independent	Inquiring
Architecture	-1.308	-0.776	1.846*	0.132	-0.716
Design	-3.005	2.341*	2.007*	0.613	-1.352
Engineering	4.467*	-1.685	-3.955	-0.776	2.138*
Pearson Chi-Square = 33.744; DF = 8; p-value: 0.000 Likelihood Ratio Chi-Square = 34.714; DF = 8; p-value: 0.000					
Product design aspect: Designing product shape and geometry					
*Background/*Style	Conditional	Creative	Exploring	Independent	Inquiring
Architecture	-0,1274	0,6886	-0,6336	-0,7901	0,7784
Design	-2,3931	1,0459	1,0564	-0,2692	0,4722
Engineering	2,6634	-1,8022	-0,4802	1,0818	-1,2851
Pearson Chi-Square = 13.048; DF = 8; p-value: 0.110 Likelihood Ratio Chi-Square = 15.146; DF = 8; p-value: 0.056					
Product design aspect: Searching for a solution to assemble product components					
*Background/*Style	Conditional	Creative	Exploring	Independent	Inquiring
Architecture	2,2450	0,4000	0,2974	-0,5531	-1,9321
Design	-0,8203	0,6924	0,4428	-0,8717	0,1218
Engineering	-1,3948	-1,1368	-0,7690	1,4810	1,8191
Pearson Chi-Square = 11.614; DF = 8; p-value: 0.169 Likelihood Ratio Chi-Square = 11.493; DF = 8; p-value: 0.175					

* *Significant at 95% confidence level or more*

Architects, who presented the highest *creative* style preference scores in our study, are the ones who favoured the use of the experiential system (intuition) in Rosa et al. (2016). Being creative, in our research, refers to making sense of the whole, even valuing emotional reactions. Creativity, in this particular sense, is aligned with the operations of the experiential thinking (Volpentesta, Ammirato, & Sofo, 2009). Therefore, our study reinforces the premise that architects to prefer to think associatively and intuitively, and they tend to be more flexible in thinking than other professionals. Architects may add great value in creating innovative products that are not necessarily based on similar choices available on the market.

On the other hand, Rosa et al. (2016) observed that engineers favoured rational decision-making when designing products. Our results show that they scored higher in the *conditional* thinking style, suggesting that they prefer to rely on proven data and models. Engineers seem to be valuable professionals to design new products based on tangible analysis of plausible choices.

Finally, according to Rosa et al. (2016)'s results designers did not exceed in rationality or experientiality, compared to architects and engineers. These professionals "might be more likely to find a balance on their reliance on different thinking styles. That is, Designers showed that, when comes to judging options and making decisions, they rely on their analytical thoughts, but also use

their past experiences and intuition" (p.559). In our study, *exploring* and *creative* thinking styles were those that better represent designers, which means that they may transit between considering wide ranges of choices (*exploring* style) and making sense of the whole picture in a project, even taking their own emotional responses into account (*creative* style). That reinforces the idea that thinking styles are fluid (Sternberg, 1997; Zhang & Sternberg, 2005), and that people may change them according to what best suits certain contexts (Sternberg & Grigorenko, 1993).

When studying decision-making styles, Rosa et al. (2016) found that designers, architects and engineers adopt both rational and experiential systems when designing a product. Our results add to those findings. Some professionals, i.e., designers, seem to fluidly use distinct thinking styles that are not solely related to intuition or rationality, but others, i.e., engineers, seem to be more stereotypical in using one process – rationality. New studies could be carried out in order to clarify those relations between type of information processing (intuition and rationality) and design thinking style.

There is no better thinking style, generally speaking. They are different ways to approach problems and to think about solutions during a design process. Therefore, we can question if there is an optimal thinking style for diverse stages of a product design process. Our results indicate that this might be a possibility in some steps of product design, and point out to the value of multidisciplinary teams composed by professionals with distinct backgrounds and roles in different moments of the process.

When professionals search for a concept vision, designers exceeded in being *exploring*, and engineers in being *inquiring*. Considering a concept as the idea behind the design outcome, all reasoning to create it and its underlying logics, designers may add value by looking for innovative alternatives in product design. A product's concept vision will help shaping aesthetic elements and functions, among others.

When they design product functionality, designers tend to be *creative* and/or *exploring*, architects to be *exploring*, and engineers to be *inquiring*. Adopting an inquiring thinking style, in this particular stage, is an important role in product design, since the improvement in the understanding of the problem, based on objective questions, may be crucial for a product success on the market.

When these professionals design product shape and geometry, and search for a solution to assemble a product's components, results did not indicate significant associations between thinking styles and professional backgrounds. Therefore, in a multidisciplinary team, the attribution of specific roles to each one of them do not seem relevant.

It is pertinent to highlight that projects commonly face uncertainty (Kahneman, 2013; Stanovich & West, 2000; Tonetto & Tamminen, 2015) and start from wicked problems (Buchanan, 1992). Wicked problems are ill-formulated challenges to product designers, in which professionals often cannot get straight to outcomes, since they usually work on unclear or undefined briefs. Therefore, only the logics of rationality and solutions generated by thinking styles based on concrete reasoning may not be always sufficient in all cases. Intuitive thinking is needed to deal with uncertainty. Both – intuition and rationality – are not represented by a dichotomy (Kahneman, 2003); they can and should work together when it comes to designing products.

It is also true that industrial design many times is concerned with solving very objective issues. Therefore, each design problem will face professionals with a new challenge that might be more or less clear and structured. Thinking separately about the relationships between uncertainty and intuition, and certainty and rationality, we might find tempting to accept the illusion of relating specific professionals to each pair. Our dichotomist mind may also try to fit professionals and activities into dissociated areas:

> *[…] it is tempting to identify and limit specific design professions within each area- graphic designers with communication, industrial designers and engineers with material*

> *objects, designers-cum-managers with activities and services, and architects and urban planners with systems and environments. But this would not be adequate, because these areas are not simply categories of objects that reflect the results of design. Properly understood and used, they are also places of invention shared by all designers, places where one discovers the dimensions of design thinking by a reconsideration of problems and solutions (Buchanan, 1992, p.10).*

Buchanan's (1992) premises indicate how valuable styles such as *exploring* and *creative* may be, since they allow dealing with complex situations by investigating and generating alternatives. On the other hand, styles such as *inquiring* and *conditional* may also be valuable, depending on the contingencies and type of demand professionals face when designing a new product.

More than competition and fragmentation, collaboration and integration between areas are needed in product design. This may seem a prescient statement, but our data validate statistically that multidisciplinary teams may help balancing different thinking styles with a great potential to contribute in different stages of the design processes, and that architects, engineers and designers play different roles in representing these styles.

6 Conclusion

This research aimed at evaluating which thinking style (*conditional*, *inquiring*, *exploring*, *independent*, and *creative*) is preferred by professionals with different backgrounds (architects, engineers, and designers), when they work on product design. We also evaluated how these styles relate to distinct stages of the design process (searching for a concept vision, designing product functionality, designing product shape and geometry, and searching for a solution to assemble product components), evaluated by the Concept Design Thinking Style Inventory (CD-TSI). In addition, we proposed a connection between thinking styles and different cognitive systems (rational and intuitive), in order to understand if there is an optimal thinking style to deal with project uncertainties, which require the use of cognitive intuition.

It is known that we are bounded in rationality, and we do not have all the information required to design the artificial world. In order to face that, the use of thinking styles in our view related to intuition – *exploring*, *independent* and *creative* – may be essential to deal with some design challenges, such as the lack of information in different stages, and optimize the process. *Inquiring* and *conditional* styles, on the other hand, may be more useful in designing concrete assets of a product, such as its functionality.

Our findings suggest that architects tend to use the *creative* style, engineers use more the *conditional* style, and designers prefer the *exploring* and *creative* styles. In some stages of the process, each professional might have differentiated roles: (a) when "searching for a concept vision", designers favour the *exploring* thinking style over others; (b) when "designing product functionality", engineers tend to use the *conditional* and *inquiring* styles; but (c) when "designing product shape and geometry" and "searching for a solution to assemble product components", the different professionals do not have clear preferences regarding thinking styles.

The results presented in this paper contain certain methodological limitations, as it is a cross-sectional research design that should be considered exploratory. In addition, a more robust statistical analysis was not possible, considering the sample size. Since it was a voluntary research, there is also the risk of self-selection sending. Finally, the results are limited to the sample, composed only of Brazilian professionals, and should not be generalized.

We strongly suggest the conduction of new empirical studies investigating the relationship between intuition, rationality, and thinking styles. The connections we have proposed are grounded on a theoretical background. New studies would clarify our knowledge about the decision-making process

in the context of product design, which could be useful for educational contexts and work team recruitment, having a significant impact on product design.
Future research may address the similarities in the use of the five thinking styles defined by Volpentesta, Ammirato and Sofo (2009) and their roles in collaborative problem-solving (Gu, Shao, Guo, & Lim, 2015). It is known that adopting roles in those contexts may be beneficial to the learning process (Gu, Wang, & Mason, 2017; Gu et al., 2015). Such studies could help to clarify if assigning roles to students can facilitate the use of different thinking styles in product design and prepare professionals to face the variety of challenges presented in these tasks.

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A Framework to Maximise Design Knowledge Exchange

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This paper explores the conference theme of design as a catalyst for change through a set of reflections regarding the experience of delivering several major design knowledge exchange projects. Based in a university context, the projects have worked with more than 500 companies over 15 years and total in excess of £6.5million in value. The paper outlines the experiences of developing and delivering the projects. It explores the efficacy of the various delivery vehicles in relation to developing design awareness, knowledge, use and strategic commercial exploitation. Finally, the analysis proposes a framework for optimising the exchange of design knowledge between universities and companies to maximise change through design and the consequent economic growth.

design knowledge; knowledge exchange; adding value through design

1 Introduction

In the United Kingdom, there have been many national and regional initiatives to develop the application of design in small and medium-sized enterprises (SMEs). Design-led manufacturing is seen as a primary means by which SMEs in traditional industries can combat the threat of low cost overseas labour and compete successfully in the global marketplace. Examples include Cox (2005) and European Design Leadership Board (2012).

As a result, universities and others, have been actively encouraged to develop support programmes to improve design and innovation capabilities in SMEs, and have received significant funding through various regional, national and European initiatives.

The following examines four such projects or case studies to investigate how design may be used as a catalyst for change. These were all designed and delivered by Birmingham City University to meet funding, primarily European Regional Development Fund (ERDF) and regional development agency, requirements. It presents some of the major findings from the experience of more than 15 years working with over 500 companies and attracting over £6.5million in funding. As such, it is restricted to a single geographic area, design usage in SMEs, comparatively short interventions and a relatively small sample investigated through from initial engagement to final evaluation.

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Rogers (2003) states "If an idea seems new to an individual, it is an innovation". Thus, innovations are not necessarily technological, they may relate to design processes, market research or environmental trends. The term design is also used in a broad sense to mean the development of products or services. This includes areas such as product design; visual communications pertaining to packaging and branding; and monitoring of external trends and competitor activity. The links between design and innovation are explored by others including Hernandez, Cooper, Tether and Murphy (2017), Hobday, Boddington and Grantham (2011), Hobday, Boddington and Grantham (2012), and Tether (2005, 2009). Therefore, for the purposes of this paper, it is accepted that a company that uses design more will become more innovative and, as a result, more competitive.

1.1 Project development and the value of a framework

As stated by Bessant and Venables (2008) while investigating the creation of wealth from knowledge:

> *What are the mental models that underpin our thinking about how innovation works? Do we know who the relevant actors are and what 'good practice' might be in terms of getting them to work together better? Are some innovation systems, whether across a particular sector, in a region or around a major transnational firm – more effective than others – and if so why?*

An aim of this paper, based on the experience of delivering the projects described in more detail below, is to propose a framework to provide guidance to practitioners trying to build similar knowledge exchange and innovation environments. In the funding streams used to support the work, primarily ERDF and regional development agency, businesses becoming more innovative is a desirable outcome. However, there is no detailed guidance on:

- What knowledge/information is needed to help potential beneficiaries to make positive changes to bring about growth?
- What are the best mechanisms to transfer and exchange knowledge? A supplementary question may be: are the methods for transfer different for different types of knowledge, eg technical, IT, and design?
- Are there any company characteristics, capabilities and capacity issues needed to make successful transfer more effective?
- How can the most suitable companies be attracted to any scheme? How should the most appropriate companies be selected?

This paper attempts to address that challenge by developing such a framework by reflecting on real-life experiences as well as combining apposite theories, models and ideas from the literature.

1.2 Design as a catalyst for change

In this work, the focus of project delivery is primarily on improving product (or service) development within client companies and helping them to be more innovative through using design.

To this end, in an attempt to visualise how this may be realised, the delivery team devised a novel tool – the innovation ladder. This is shown in Figure 1. The ladder served several purposes:

- it underpinned the development of a needs analysis and means to provide a baseline prior to businesses being assisted;
- it provided a simple structure by which the improvement of business could be envisaged; and
- the notion of moving a company up the innovation ladder indicated appropriate services that could be provided to companies to improve their innovative capabilities.

Thus, through the ladder, design was seen as a catalyst for change by improving economic performance of beneficiaries – it is not (in this work) seen as a catalyst for wider societal change.

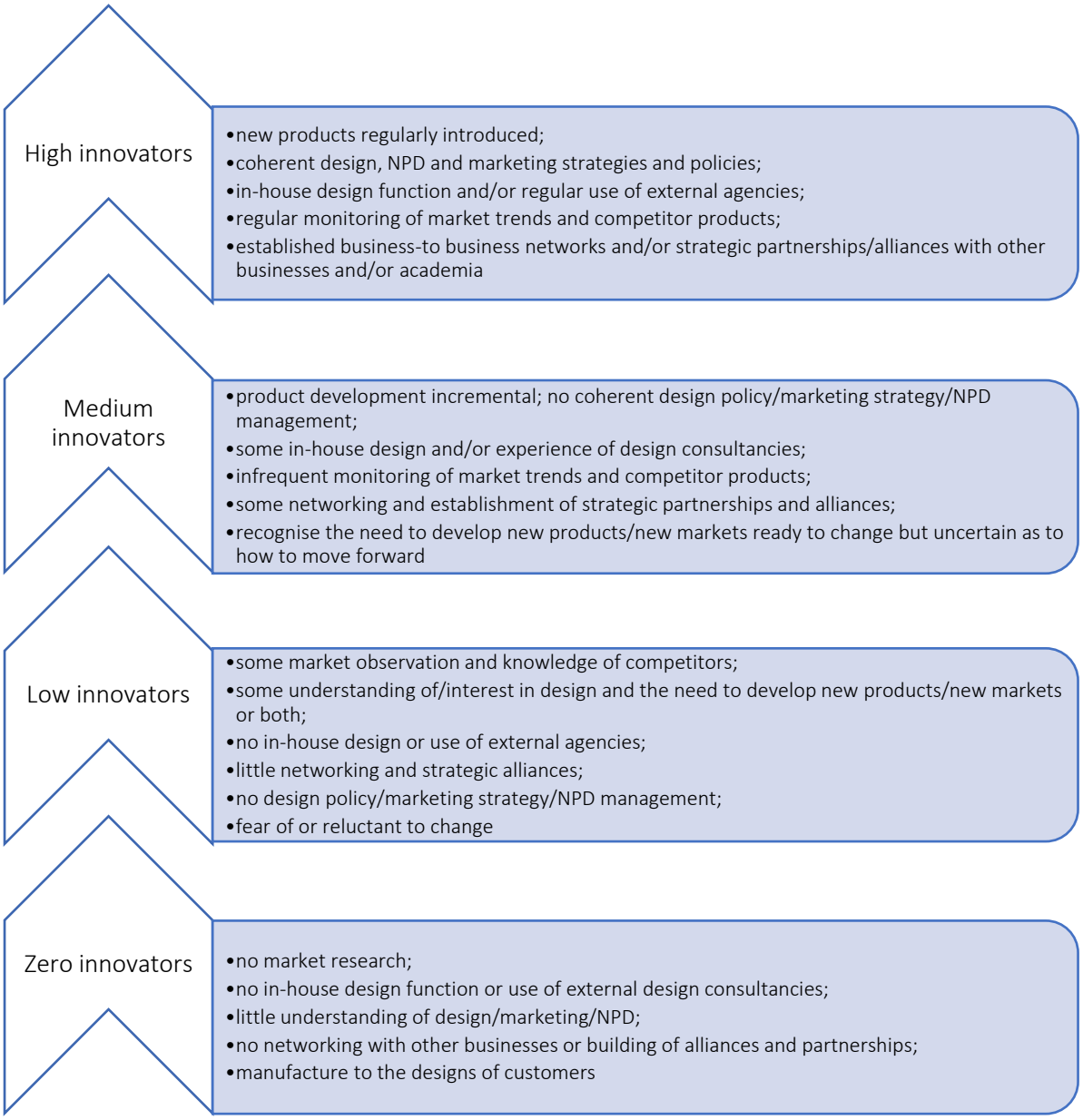

Figure 1: The innovation ladder

2 Methodology

The case studies are:

- the Centre for Product Design Information, a web-based resource of product design and related information;
- Design Knowledge Network, provision of product development and design related consultancy services;
- Furniture West Midlands, a networking and action group for furniture designers and manufacturers; and
- Interiors and Lifestyle Futures, delivering tailored workshops and building collaborative groups to enable SMEs to exploit high value markets and/or develop high value-added products.

Developed in response to national and regional policies to gain funding, all the projects have had to provide services to local industry. Priorities of the funding streams (AWM, 1999a, AWM, 1999b, AWM, 2001, AWM 2007) include:

- the need for the West Midlands region to build a diverse and dynamic business base;
- the importance of innovation through design;
- the need for companies to collaborate and develop joint ventures;
- promotion of an innovative culture with knowledge transfer between companies and between companies and higher education institutions; and
- a focus on clusters and cluster development.

The funding, primarily ERDF and the regional development agency, invariably carries several constraints, including:

- Projects are normally tasked to achieve business assists or interventions. These involve the provision of a free advisory service to a company for a few days, usually two to five. The business should then implement the advice and make changes which result in measurable benefits such as new and safeguarded sales and new and safeguarded jobs. These results should be directly attributable to the service provided by the project and realised within the project's lifetime if not more quickly.
- Assisted companies should be SMEs, ie, those that employ fewer than 250 people, be in a prescribed geographical location, eg, a specific part of the West Midlands region and within certain industry sectors, eg, interiors and lifestyles.

Within the boundaries of the funding requirements, projects can deliver their own programme of services to meet the output targets of new and safeguarded jobs and/or sales.

The projects are described in more detail by Burns, Ingram and Newport (2001) and Burns, Jefsioutine and Knight (2003), Burns and Ingram (2004), Burns (2007) and Burns and Ingram (2008). Although described as projects the term design support programmes as used by Acklin, Cruickshank and Evans (2013) and Gulari, Melioranski, Er and Fremantle (2017) could also be used. The following describes each case study in more detail.

2.1 Centre for Product Design Information (CPDI): 2000 – 2001, total value £960,000

To meet its objective of assisting SMEs to improve product development and innovation, CPDI created a website of product design information including:

- over 150 materials and 200 manufacturing processes;
- an introduction to legislation relating to product design;
- human factors and ergonomics material;
- design theory covering over 20 design management techniques, tools and processes; and
- a directory of over 150 design-related companies, encompassing design consultancies, designer-makers and materials suppliers in the West Midlands region.

By the end of the project, the site had over 1,000 registered users and a monthly hit rate of 100,000. Business assists, totalling 158, were achieved through West Midlands region companies being registered on the site and or members of the website directory.

A significant lesson learned in delivering CPDI was that the effectiveness and usage of the website was difficult to evaluate. Thus, while this project provided an extensive resource of information, its remoteness meant it did not interact with the intended beneficiaries or provide tailored information to meet user needs.

2.2 Design Knowledge Network (DKN): 2002 – 2008, total value £2.6m

Concurrent with the delivery of the CPDI project, UK government policies both regional and national had recognised and emphasised the development of clusters as a significant instrument in regional development (Trends Business Research, 2001). As a result, Advantage West Midlands, a regional development agency, identified several priority clusters. These included high value-added consumer

products comprising carpets, ceramics, clothing, designer-makers, furniture, glass, jewellery and leathergoods, where adding value through design was seen as significant contributor to companies establishing a competitive advantage.

In response, Birmingham City University developed a successful funding bid to help SMEs in this cluster to become more innovative through improvements to the product development process, increasing market knowledge and planning as well as advancing the use of design to add value. This became the DKN project.

Combining the lessons learned during CPDI delivery with the focus on cluster development, DKN devised and delivered various one-to-one business services. These included:

- introducing or improving a company's design process;
- increasing understanding and usage of trends;
- competitor and product knowledge and analysis; and
- market research and market planning.

The intervention, totalling five days, usually entailed business research and analysis, presented in the form of a report. The assistance was provided after a thorough needs analysis including design capabilities. This found that no companies had a formal design process or strategy.

The project completed 181 five-day business assists for 70 companies. However, as the project progressed, it became apparent that, although the vast majority of beneficiaries described the intervention as useful, many were not implementing the recommendations as fully as they could.

2.3 Furniture West Midlands (FWM): 2003 – 2009, total value ~£200,000

FWM's creation and development was also a response to the desire to build industry clusters. It aimed to develop a network of furniture manufacturers and designers, following a mapping exercise that had found that the region's industry contributed over 10% of the national total (AWM, 2003).

Following an initial conference to launch the cluster, a group formed to lead the network. It identified three priorities: design; training and marketing. With public sector support, FWM developed a brand identity, website, newsletter and supporting events to build the membership. The group attracted regional and national attention including government, trade and local press and national trade bodies.

A relatively small project in monetary terms, FWM was not contractually obliged to deliver outputs or results. Nevertheless, many positive outcomes were achieved including increased trading between members, recruitment of graduate designers together with student placements and projects; and links into various university, consultancy and advisory programmes.

A highlight was the 'FWM design selection', shown at the international Interiors Show in 2006. Of the 13 companies represented, five developed a new design or prototype specifically for the show.

2.4 Interiors & Lifestyle Futures (ILF): 2009 – 2015, total value £3.6m

ILF was devised in response to the Interiors and Lifestyle cluster plan (AWM, 2008). The plan expanded the high value-added consumer products cluster to include more sectors, such as lighting, floor and wall coverings, travel goods and artworks. It also promoted building communities of companies as well as the development of services to help companies to exploit high value markets and/or develop high value-added products. The plan specifically mentioned design as a means of companies improving products or services to become more competitive and innovative.

The ILF programme consisted of four elements:

- **Discovery** developed for larger companies, where an individual assessment to identify needs and priorities was followed by groups of similar companies exploring opportunities for forming alliances to address key issues.

- **Visioning** aimed to meet the needs of the smaller, creative businesses such as designer-makers. Delivered as a two-day workshop, it helped participants to identify opportunities as well as planning how to get the best from their practice.
- **ILF Venture** supported individuals to establish new design led- businesses through an intensive six-month programme of workshops and mentoring.
- **Knowledge base collaborations** provided intensive support to address a specific business issue.

In total, ILF worked with 300 businesses, primarily through two-day workshops and created over 30 new businesses. It developed new tools and techniques to foster collaborative groups and provided an environment where joint working could flourish. ILF also showcased over 70 companies both through exhibitions and international and national tradeshows, highlighting the design and manufacturing skills of the region's businesses.

The following presents the lessons learned through participant feedback and reflections of the delivery teams.

3 Findings and implications

The above has described four projects that have taken different approaches to improve the innovative capabilities of companies through increasing the awareness and usage of design. The following compares the projects and explores the issues arising from the experiences of delivery.

Each project has taken a different approach to increasing design awareness and usage, the lessons learned in earlier projects being applied in the development and delivery of later projects. They have also had different levels of funding and resources. Unsurprisingly, this resulted in different strengths and weaknesses as shown in Table 1.

In the table, design impact refers to the general increase in awareness and usage of design by the participating companies. The impacts could be small or incremental and do not necessarily result in significant changes at the company level and/or externally.

However, in trying to construct an evidence-based comparison of different projects to assess their relative value in effecting changes in design awareness, usage and management, clear and agreed benchmarks and measures of design are needed.

Design benchmarks might include:

- the existence or size of the in-house design department;
- the number of new products introduced on an annual basis;
- usage of university and other knowledge transfer channels;
- the presence of a written company design process;
- evidence pertaining to the design being integral to business plan and management structure; and
- the number of collaborative relationships.

The ensuing measures would then be increases in the benchmarked values of the above. Measures of design impact are discussed further by Burns and Annable (2011).

In its provision of one-to-one support, DKN was probably the most successful, with an emphasis on demonstrating to the company how they might repeat the activity in the future being included in the report. The Visioning workshops in ILF included an action plan developed by the participant to maximise the likelihood of implementation post activity. However, none of the projects had enough funding to measure their success at a later date, particularly with respect to how much design had effected real change in the company. All projects were not sustainable in the long term.

Table 1: Comparison of projects by characteristics

Project	Relationship	Number clients	Design impact	Cost	Delivery vehicle	Strengths	Weaknesses
FWM	Many-to-many; network of companies to provide mutual support facilitated by the public sector	~200	Low	£	Support of a collaborative group, showcasing	Forged new links and raised profile of industry as a whole and design in particular	Not sustainable in the longer term – once public funding and resources were removed, the group floundered and is currently inactive
CPDI	One-to-many; provision of web-based information	>1000	Medium	££	Website	Analysis of sector information needs and the development of a usable website	Lack of follow-up of target users to check on assumptions made during development and an understanding of how information could be used by companies to improve or change performance
ILF	Combination of one to few (workshops), one-to-many (website and social media) and one-to one (knowledge base collaborations)	~400	Medium to high	£££	Workshops, support of collaborative groups, showcasing, individual assistance	Raised the regional capability in high-value, design-led and quality manufactured products through national and international showcasing Creation of new businesses Well-funded allowing the delivery of a range of activities to suit various needs	Companies relying on secretariat function and unwilling to put own resources and money into sustaining benefits
DKN	One-to-one; range of bespoke consultancy services	<100	High	££	Bespoke individual reports, eg, competitor analysis, design process, marketing plans	Intensive assistance tailored to individual needs, follow-up of company change some time after assistance provided	Once assistance complete, no further support provided to help implement advice No contact between companies

3.1 Other findings

As well as the comparison of delivery mechanisms and project strengths and weaknesses described above, the experience of delivery of these projects has elicited some more general findings. These are presented in the following.

3.1.1 Clusters and collaborative working

Many of the regional policies emphasised the formation of clusters and the potential benefits arising from companies working together. According to Enright and Ffowcs-Williams (2001), these include:

- increases in the rate of innovation;
- enhanced productivity and improvements in the competitive performance of firms;
- a method by which companies can exchange ideas, knowledge and priorities with the public sector, particularly at the local and regional level, the results of which can be fed back to inform the policy and action plans of the public sector;
- assistance with improving the supply chain and supplier relationships; and
- increased efficiency through collective action.

In the case studies described above both networking and collaborative groups were formed. In the short-term these proved very fruitful, especially with regards to showcasing design and manufacturing skills. However, in the longer term, the groups failed to become self-supporting.

3.1.2 Company differences

Initial feedback, undertaken soon after the assistance, indicated that the projects provided a valuable range of services to its client base. However, follow-up conducted once a company had had a realistic period in which to apply recommendations and achieve improvements, proved less satisfactory. It became apparent that some companies were more successful in implementing recommendations than others.

3.1.3 Design or marketing?

During the earlier projects it was supposed that companies would already know how to do marketing and market research. However, when assessing company needs, it became clear that this was not the case. Therefore, improving design seemed futile if companies lacked the basic techniques to promote or sell the resulting products. Further, in later projects, needs often included understanding routes to market or sales promotion.

Additionally, companies were unaware of their position in the market place, who their competitors were or what external trends could affect their business or should be incorporated into their products and services. Much of this activity is in the area sometimes described as the fuzzy front end, see Koen et al (2002).

These related observations suggest that defining the correct need of a company as well as providing the correct information is key in optimising project performance.

3.1.4 The non-linearity of the design process

During delivery of the projects, it was observed that most SMEs have informal and chaotic business processes. In proposing a linear design process, as per the British Standard BS7000-2:2015 design management guidelines (BSI, 2015), follow-up work found that such models were not implemented by the companies. As described by Annable and Burns (2009), this observation resulted in the creation of a new model that incorporated front-end thinking, tailored for the design process resources and capabilities of SMEs.

3.1.5 Project management

There are many programmes focused on the transfer of specialist knowledge from academia to industry. These are centred on a conviction that, if properly applied, this knowledge will prove advantageous to one or more companies. However, the experience of the case study projects

indicates that a major difficulty of implementing a business or design support project, is the range of areas of expertise and skills needed to deliver a successful programme.

These include: administrative, planning, communication and organisational skills and foresight; budget management; good interpersonal skills; a basic understanding of economics and the fundamentals of regional development; some semblance of integrity with businesses, ie, an ability to move from the academic environment to a business one seamlessly, adept in the linguistic nuances of each; an understanding of company development and learning; research and analysis skills; and an appreciation of the type of knowledge to be delivered, and the methods most appropriate for its transfer.

Some of this can supplied through buying-in specialist expertise. However, there are often budget restrictions as well as the additional complexities of managing a larger delivery team. Thus, a good project manager needs a wide palette of skills in addition to the specialist knowledge deemed to be of value to industry. It is not within the scope of this paper to explore this further, but it would be valuable, in the future, to investigate the link between the success of projects and the capabilities of their managers.

It was also apparent, through the project experience, that collaborative activity between companies requires the support of independent brokers, such as university staff, and once that support is removed partnerships struggle to survive.

4 Discussion

In moving towards a framework for maximising design knowledge exchange, the above has highlighted several areas that merit further investigation.

Over the 15 or so years covered by these projects, their objectives have moved from improving product development to also developing high-value markets. However, a common rationale is that the usage of design will result in adding value so that companies do not need to compete on price alone. Value may be added through appearance, materials, methods of manufacture, reducing manufacturing costs, improving quality and usability, or a combination of some or all of these factors.

The emphasis of the projects has also changed as lessons learned internally are combined with the external development of policy instruments, such as building collaborative groups, by funding and development agencies. This can be considered to be action research, where reflection on experience informs future practice (Leitch & Day, 2000, Robertson, 2000 and Swann, 2002).

4.1 Differences between companies

Throughout delivery of the projects it has been noted on numerous occasions that given similar recommendations and advice, companies behaved in different ways, eg, some would take it on board, make changes and generate results, others would do nothing.

A possible explanation lies in the notion of absorptive capacity first defined by Cohen and Levinthal (1990) as the capability “of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends”. Their work was extended by Zahra and George (2002) who produced a refined definition of absorptive capacity as “a set of organizational routines and strategic processes by which firms acquire, assimilate, transform, and exploit knowledge for the purpose of value creation”.

In their review of the literature relating to the role of external expertise to business growth and development, Bessant, Phelps and Adams (2005) state:

> *We conclude from the review of the absorptive capacity literature that organisations have different capacities to absorb new knowledge and this is dependent on state of*

existing knowledge, the nature of what is being transferred, degree of homophily, the extent of ability and motivation and access to external knowledge.

This chimes strongly with the experience of the projects discussed above in that for a company to make changes, it needs to have the capacity and the capability to use that knowledge. Thus, it appears that absorptive capacity provides a method to consider a company's capabilities to determine its ability to assimilate and use new knowledge.

4.2 Defining the knowledge need

Bessant et al (2005), combine the knowledge states derived from the absorptive capacity literature with six tipping points to develop a two-dimensional framework to classify a company's growth states. They suggest that a company can be mapped on to this framework to identify priority areas for assistance. The six tipping points are: operational improvement; people management; obtaining finance; formal systems; strategy; and market entry. The four levels of absorptive capacity or knowledge states are:

- ignorance of key issues;
- awareness of key issues;
- knowledge and understanding of key issues and solutions; and
- implementation of actions to address key issues.

Throughout the review, by Bessant et al (2005), there is no mention of design as being of benefit to growing businesses or its links with innovation. To address this shortcoming, Burns (2009) extends the Bessant et al (2005) model to suggest design tipping points for firms with respect to increasing their use of design. These are given in Table 2 and provide a basis for the design knowledge needed to improve company performance.

Table 2: Design tipping points

Tipping point	General considerations	Design specific considerations
People management	Delegation of tasks, managing people, establishing functional or geographical teams	Employing designer(s), working with external consultancies
Strategy	Definition of types of work to accept or markets to target, development of brand and market position	Marketing strategy, product/service development strategy, branding and communications strategy
Formal systems	Developing systems to ensure consistency and reduce risks of things going wrong	Design process, product development process, customer feedback database
New market entry (new customers, new areas, new products)	Adapting business model to the new market, scaling-up of business, understanding new customer needs	Customer needs research, market research, competitor research, trends analysis, assessment of different market opportunities, adaptation of product offering
Finance	Obtaining funds to grow and meeting funder requirements	Obtaining funds to grow and meeting funder requirements
Operational improvement	Understanding process capabilities and best practice	Understanding and defining product development; design and marketing processes

4.3 Meeting the knowledge need

How the need may be met obviously depends on what has been identified as the knowledge gap, as well as the availability of resources and specialist expertise. In the experience of the projects, identifying opportunities using tools such as STEEPLE (Social, Technology, Economic, Education/ethics, Politics, Legal, Environmental) analysis, product positioning maps and investigating competitors have all proved fruitful and led to the development of new and improved products.

4.4 Understanding of knowledge exchange

In developing these projects and the mechanisms to transfer the knowledge needed by a company from the University context, project logic models have been found very useful. There has been a move in various funding streams, both structural and research, to request project logic models, for example, see AHRC (2007). As shown in Figure 2, these consist of a number of stages:

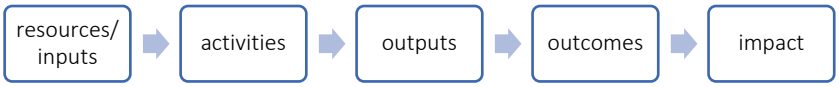

Figure 2: The project logic model

where:

- resources are what is needed to achieve the project's aims and objectives
- activities are the things to be done to address the aims and objectives
- outputs are the products that will be delivered by the activities
- outcomes are the changes in knowledge, skills and behaviour that the activities will lead to
- impact is the fundamental changes in service, organisation or community that will result from the activities

Developing such a model does help the consideration of how the project will work. However, little other guidance is supplied about the factors to consider when trying to help companies, and much comes down to the skills, experience and knowledge of the delivery team.

In the work described in this paper, transfer mechanisms have included websites (widely available, relatively low-cost, good for providing long-term support, no ability to offer tailored advice); workshops (restricted availability, medium to high cost, a supportive environment, semi-tailored assistance) and reports (restricted availability, medium to high cost, very tailored advice, little follow-on support). What is best depends on the particular results to be achieved.

5 A framework for maximising design knowledge exchange

Throughout, the projects have been trying to improve companies' capabilities and capacity to grow. With experience, it has become apparent that effective projects depend on both transferring the right knowledge as well as the ability of the beneficiary company to use that knowledge to effect changes and innovation. An aim of this paper is to codify that experience and combine it with findings from the literature to provide a framework to maximise design knowledge exchange.

This is shown in Figure 3 and comprises four stages: measuring the capacity of a company; determining its knowledge needs (or opportunities); defining the knowledge to be supplied and transferring this knowledge.

It is intended that the framework is used linearly and that no stages are neglected. Figure 3 also includes tools and techniques that can be used at each stage.

What is then provided and how depends on what is needed as well as what can be afforded.

6 Other considerations

There are several assumptions implicit in the funding programmes:

- The notion that companies can be improved quickly and easily by the provision of the right services. Successful funding applicants need only to establish a sector's needs, devise appropriate assistance and services to address those needs.

- There is a body of willing companies ready to take advantage and implement the assistance to effect lasting and positive change.
- Beneficiary companies are capable and have the capacity to make changes.
- The link between the service provided by the project to a measurable benefit, such as new sales or jobs is easy to evaluate and articulate.

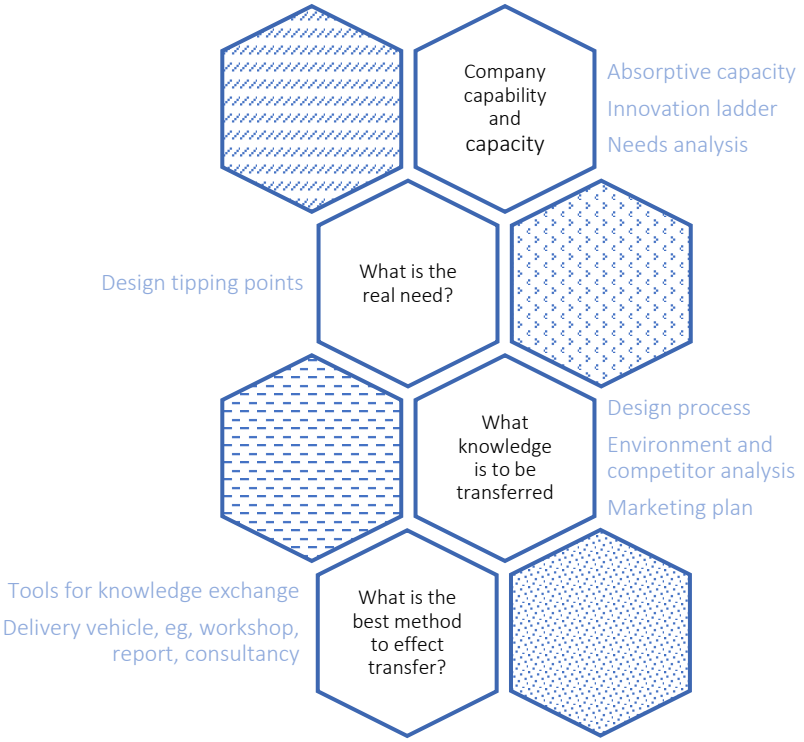

Figure 3: A framework to maximise design knowledge exchange

However, as discussed by Meagher and Lyall (2013), effective knowledge exchange in a social science context has at least three fundamental challenges:

- *knowledge exchange processes can be subtle and elusive*
- *improvement of knowledge exchange processes calls for attitudinal and behavioural changes at multiple levels*
- *protracted timescales can be required to achieve these changes*

Further, the real changes may be hidden in time through changes in company structure, ownership and personnel. This is further compounded by Tether's (2005) observation that "there is no single body of 'design knowledge' and much design (and innovation) practice is tacit and largely learnt through experience."

Attempting to link changes with programmes delivered a few years before can be extremely problematical. Tether (2005, 2009) also explores the nature of 'hidden design' where companies link their design costs into marketing and/or R&D expenditure. Therefore, the real value of a design activity or change, may not be measured or explicated.

These observations are mirrored in the work described here. Through necessity, this work focuses on knowledge exchange delivery vehicles, company capability and capacity as well as aspects of project management. A better understanding of organisational learning and the role of tacit knowledge, eg, Nonaka (1994), Nonaka and von Krogh (2009), may provide insights into the better

provision of support that is more likely to achieve real change. All the case study projects are relatively low cost with a focus on building design awareness and usage. Embedding design for the longer term may only arise from the more expensive options such as knowledge transfer partnerships or similar schemes. A good understanding of what and how design may result in long-term change is needed here.

Indeed, change may also be seen as impact (REF2014, 2012). As discussed by Hernandez et al (2017), the impact of design is being explored widely in the literature, not least due to the demands of the UK's Research Excellence Framework. The last survey in 2014 included impact case studies where institutions presented the non-academic impact of their research. In the case of the Art and Design Unit of Assessment, only 20% of the case studies related to design implying that there is a long way to go for design to be a real catalyst for change.

7 Conclusions

The above has explored four university-based case study projects that have responded to the priorities of regional policies and delivered services to regional industry. Major findings from the work undertaken over 15 years include:

- The effective transfer of design knowledge depends on the capacity of a company in addition to the identification of the most appropriate support.
- Weaknesses in marketing are a greater priority than design for most SMEs – gaps in marketing ability were having more critical impact than design issues in a company reaching its full potential.
- A company's external environment and competitors are an overlooked source of opportunities for growth. There is a general lack of knowledge regarding how observing a company's external trends (eg, social, technological, environmental and political) can point to opportunities or threats to a company's performance.
- The effective transfer of design knowledge depends on the capacity of a company in addition to the identification of the most appropriate support.

In examining the lessons learned through this experience, as well as investigating the extant literature, the work has presented a framework for maximising the transfer of design knowledge.

However, with a reporting focus on eligible expenditure and outputs achieved, the funding agencies do not encourage or facilitate constructive reflection on the efficacy of delivery methodologies or soft outcomes, such as business change and improvements. Indeed, while the last ten years has seen significant moves towards ensuring that projects are managed properly, virtually no guidance is provided on the factors to consider when trying to help companies, despite a plethora of literature in the knowledge exchange, open innovation, communities of practice and diffusion of innovation arenas.

As a start, this paper presents a new framework combining project logic models, tipping points and knowledge transfer elements to assist in developing projects to increase regional innovation and competitiveness.

However, best practice is not being collated due to a focus on project outcomes, eg, new sales, new jobs, not on the processes involved. Further, while there are no agreed measures of design improvements, it is not easy to compare project methodologies and approaches to delineate unambiguously the lessons learned and spread best practice.

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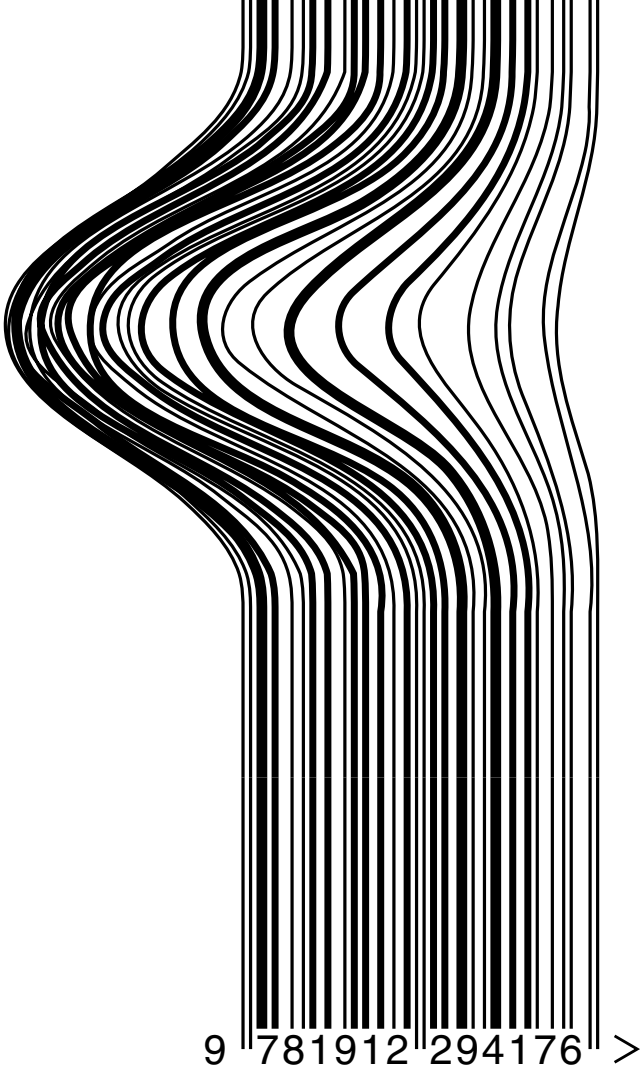

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