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Research Perspectives IN THE ERA OF *Transformations*

Edited by

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Gerda Gemser
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Editors

Erik Bohemia, Gerda Gemser, Nuša Fain,
Cees de Bont and Rita Assoreira Almendra

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Conference proceedings of the Academy for Design Innovation Management

The Academy for Design Innovation Management (*A*DIM) is an international network organisation with the aim of building a community of design innovation management researchers. The main objective of the ADIM is to serve as a platform for knowledge creation and to foster collaboration within the field of design innovation management, and to promote the use of results and knowledge for the good of humanity.

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Editorial: Research Perspectives in the Era of Transformations

The Academy for Design Innovation Management (*A*DIM) Conference series facilitate sharing of knowledge, collaboration and advancement across a diverse range of Design Innovation discipline areas. The 2019 conference attracted speakers and attendees from across the globe, including recognised industry professionals, international scholars and emerging researchers operating in the creative, commercial and service industries. The *A*DIM 2019 conference general theme 'Research Perspectives in the Era of Transformations' provided a backdrop to what is taking place within the field of design innovation. It also signalled a desire to enable a more diverse intersection views at the conference. Thus, one of the aims was to open spaces for the early career research to actively join shaping the field of design innovation research. During the 2017 conference we succeeded by attracting significant number of early career researchers who represented a third of the conference delegates. One of the outcomes was entablement of the *A*DIM Collective. The *A*DIM Collective is now on-going global initiative of the Academy for Design Innovation Management that connects doctoral students and early career researchers from leading universities around the world. The aim of the *A*DIM Collective is to establish a strong professional network of PhD and early career researchers in the field of Design Innovation Management. *A*DIM Collective reaches this aim by providing opportunities for members of the *A*DIM Collective to meet, develop professional skills and build strong ties with other researchers interested in similar research topics. *A*DIM Collective encourages leading academics to share their experiences with the new generation of design management scholars through events, meetings and symposia. The *A*DIM Collective has successfully organised three Research Development Workshops.

Unfortunately, the opportunity to travel to conferences is not equally distributed among researchers, which meant that scholars from the 'Global South' were underrepresented at the 2017 conference. Therefore, for the 2019 conference we offered bursaries specifically targeting early career scholars from the 'Global South' to enable them to bring and share their research perspectives. Supporting early career researchers to attend the ADIM conference provided an opportunity for these scholars to present their research and gain feedback on their work, as well as network with other design innovation scholars and forge exciting, new research partnerships. We are grateful to ThinkPlace, a design network spanning eight studios across five nations, which supported a full early career research bursary.

We would like to thank the keynote speakers, Professor Rachel Cooper (the founding director of Imagination, Lancaster University) and Mr Chris Thompson (the founding Partner of Viadynamics), Mr Eric Quint (Vice President and Chief Design Officer, 3M Company) and Professor Alison Rieple (University of Westminster) who generously gave their time to share their insights with the conference delegates. Their generosity allowed us to offer bursaries to fifteen emerging researchers to attend the conference. The bursar recipients were selected from over 40 applicants. The number of applicants indicates the need for funding schemes to allow emerging researchers from the Global South to attend international events such as this conference.

We are also grateful to 28 conference delegates, of which 5 were PhD candidates, who selected to register with 'Do GOOD' registration joining fees. The 'Do GOOD' fees help the Academy for Design Innovation Management to establish '*A*DIM Development Research Fund for Early Career Researchers from the Global South'.

The call for paper tracks resulted in 40 themed paper tracks, which was a double the number from the 2017 conference. This increase was reflected in the number of submissions which has more than doubled when

compared to 2017 conference. Altogether, 350 submission were made by authors from 66 countries. The submissions included 255 full papers, 32 workshop proposals and 63 case studies. All the submissions were double blind reviewed. Less than 30 were of the 350 initial submission were single authored.

The 40 conference tracks, for which the call for papers was issued, were organised within 6 overarching themes (see Table 1). The track facilitators ultimately shaped the overall conference scope and direction. The tracks' topics acted as the focal points for the overall call for: Papers, Workshops and Case Studies. Thus, our thanks you go to all the tracks' facilitators. It was them who collectively were responsible for the conference programme and we would like to thank them and the track chairs for their valuable services on the International Scientific Programme Committee.

Table 1 Conference Tracks

1. Social Impact Transformation
    1.a Transformation of the ageing society and its impact on design
    1.b Re-Designing health: transforming systems, practices and care
2. Transforming Design Perspectives
    2.a Decolonising knowledge to transform societies
    2.b Design & democracy
    2.c Gender of/in design practice and profession
    2.d Power and politics in design for transition
    2.e Design innovation and philosophy of technology: the practical turn
3. Transforming design values
    3.a Moving Beyond Existing Economic and Social Models through Design
    3.b Measuring and communicating the value of design
    3.c Design policy: understanding regional and national innovation ecosystems
    3.d How does design express value?
    3.e Service organisation and design management
4. Design, Innovation and Business
    4.a Effective design leadership
    4.b Designerly ways of innovating
    4.c Transformation IN and BY design thinking
    4.d How is business shaping design? Explorations of the contextual environment and its effects
    4.e Co-creation and organisational ambidexterity (O.A.) as an innovative framework for the service industries
    4.f Strategic design of sustainable business models
    4.g Disaster management by design-driven innovation. Shelter for resilient communities
    4.h Uncovering organisational practices of design businesses
    4.i Is design thinking transforming organizations or the design discipline?
    4.j Experience Design: Method and Evaluation
    4.k The relationship between designer, ecosystem and disruptive innovation
5. Mitigating Complexities with Design
    5.a Transforming complexities through design in collaborative community-based processes
    5.b Strengthening the design capabilities of professional organisations in a complex world
    5.c Transformation of design entrepreneurship within complex systems
    5.d Impact of digitisation on transformation of Service Design Systems
    5.e Seeking signification in transformational times: design semiotics and the negotiation of meaning
    5.f Transformation by strategic design: design roadmapping and creative foresight
    5.g Design with foresight: strategic anticipation in design research
    5.h Creative confidence – transforming individuals and organisations through design
    5.i Epistemological strategies in design and management Research
    5.j Innovation through design for meaning
6. Transforming Design innovation education
    6.a Materiality in the digital age
    6.b Design literacy enabling critical Innovation practices
    6.c Entrepreneurship in design education
    6.d Design Economy Futures and Direction

We would like to also thank the over 291 expert reviewers who provided their valuable time to provide critical peer feedback. Their service on the International Board of Reviewers was invaluable as the good quality peer reviews provided a vital contribution to this international conference. Each reviewer scored papers on a scale of 0 to 10 and provided critical review comments.

Submitted full papers were double blind reviewed, though some had three or even four reviewers. Total number of submitted full papers was 255 which represents an increase of 76% when compared to 2017 conference which received 140 paper submissions. After the blind peer review process 76 papers (30%) were accepted and 65 (25%) papers were provisionally accepted as these needed major revisions, and 114 (45%) papers were rejected.

In making the final decisions about papers, the Review Committee first looked at all papers where the difference of opinion between reviewers was significant and moderated the scores if necessary. The Review Committee then discussed all papers that were just under the general level of acceptance to determine outcomes, before finally looking at any exceptions. The track chairs made a final decision whether to accepted revised provisionally accepted papers. At the end of the review process 110 (43%) paper submissions were accepted for presentations and 145 (54%) papers were rejected. Three accepted papers were presented at the conference as research in progress and they were not included in the proceedings. Although, the number of accepted papers for presentation at the 2017 conference was nearly identical 103 this represented much greater acceptance rate of 73%, and in reverse lower rejection of 26% (n=37).

The workshop track provided another intersection on how delegates and workshop facilitators interacted. Altogether, 32 workshop proposals were submitted and 9 (28%) workshops were accepted and 23 (72%) were rejected by the International Workshop Organising Committee.

The case studies track was a new addition to the conference which provided another intersection on exploring design innovation management research. To get a feel for the potential interest, authors were initially asked to submit abstracts which were double-blind reviewed. The case studies track received 62 abstracts of which 22 (34%) were rejected and 41 (66%) were invited to submit the full case study. Altogether, 26 (64%) of the full case studies were accepted for presentation and 15 (36%) were rejected by the International Case Study Organising Committee.

The *A*DIM Collective 2019 Research Development Workshop event took place a day prior to the conference. Professor Gerda Gemser run a workshop on Preparing for journal publications. Then Dr Nusa Fain delivered a workshop on How to establish a theoretical framework to guide the PhD research. Professor Rachel Cooper workshop provided the participants to engage in Mapping their PhD journey. The final workshop titled Life after PhD: designing a meaningful research career was deliver by Dr Mieke van der Bijl-Brouwer.

The Design Management Academy's international research conference was organised under the auspices of the Design Society's Design Management Special Interest Group (DeMSIG) and Design Research Society's Design Innovation Management Special Interest Group (DIMSIG). The conference was a culmination of two years of planning. It is a hope that the conference will act as a platform to build a diverse community of scholars who are interested to explore and discuss design innovation practices.

Erik Bohemia

*A*DIM 2019 Conference Chair
Chair of the *A*DIM
London, United Kingdom

Paper Tracks

Track 1.a Introduction: Transformation of the ageing society and its impact on design

LU Yuan[a]; SUNG Tung-Jun[b] and GAO Bo[c]

[a] Eindhoven University of Technology, the Netherlands
[b] National Taiwan University of Science and Technology, Taiwan
[c] Tongji University, China

There is increasing recognition of the world growing population of senior citizens, due to the rise in life expectancy and decreased fertility rates. Senior citizens are the most expensive population group for the healthcare system due to the avoidable ageing impact on health degradation. It is therefore necessary to move from the focus on curing to prevention. How can design play an important role to support healthcare prevention for the older adults? Do we need to alter our design tools and methods to be suitable for the design contexts? In this section, we gather a number of interesting papers from the scholarly in the Netherlands, China and Italy. They reported their design research experiences when designing for the specific target user groups.

When designing for societal challenges such as healthcare prevention for older adults, products need to be envisioned for this market. It is about fulfilling the specific needs of the related social groups, the older adults. Often it is hard for them to articulate their needs. Den Haan, Brankaert, and Lu proposed the Leisure Time Canvas as an empathy tool to facilitate older adults to share stories about their leisure activities and hobbies so as to elicit their desires and needs and inspire the following design. This research is especially interesting when the target users are not able to articulate their latent needs. Cui, Hu, Hengeveld and Hummels created a tangible interactive device which can encourage older adults to share their life stories in an intergenerational context. The aim of the research is how to enable and capture the stories of the elderly as well as how younger generations can be involved in the sharing of stories. The paper engages in narrative analysis to understand the kind of stories that were told according to identified themes. Kai, Hu, Hengeveld, Frens, and Hummels reported a case study of co-refining the preliminary design of an interactive system with older participants and discussed the effectiveness of the participatory design approach adopted. They found that sketching was found less effective than expected when refining the digital aspects of interactive systems for older people; the videos were more likely to trigger participants' comments on the form and interaction than the function of the systems; the animated storyboard was very useful to help the participants quickly understand the usage scenarios of the preliminary design but was not able to fully illustrate some functions and details; the hands-on experience of functional prototype proved to be very effective for the participants to fully understand the concept and facilitate them to refine the system.

When designing for preventive health for older adults, design is expected to follow an interdisciplinary approach to create, research, and implement solutions that create better healthcare solutions for older adults. Designers, technology developers, insurance companies, professional healthcare institutions, caregivers, municipalities, families, neighborhoods, and related others have to work together to create the intended solutions. How can we collectively design for and with this special target group and conduct design research in this complex social cultural context? Gao and Shen demonstrate how they came to an innovative concept to incorporate HealthRelated Quality of Life (HRQOL) with service design for efficient elderly breast cancer patient care in China. This paper presents three design opportunities (1) smart healthcare service system; (2) improvement of service scenarios in the hospital; (3) a life-long service that links communities, families, and

individuals to facilitate breast cancer patient care. This paper demonstrates the importance of integrating knowledge from other domain such as health and collaborating with stakeholders.

It is widely recognized that Product-Service System (PSS) is a promising new business creation approach for societal challenges. It provides profit and non-profit organizations with additional approaches to create differentiable innovations and build competitive advantages. It is not about designing product and product interaction only but empathizes the service-dominant logic. When designing for health prevention for older adults, PSS design has to have profound understanding of the user's needs, wants, and desires, and also has to adopt a holistic view on value co-creation with internal and external stakeholders together. Is PSS a means or an end when designing for and with older adults or both? Valk, Lovi, Chuang, Lu, Pu and Visser reported their experience in setting up a field experiment with older adults. They present a PSS method in order to engage senior adults with technology for behaviour change research. It aims to promote physical activity among older adults through smart products bearing in mind that these users are generally reluctant to accept technology. It concludes that when aiming at co-designing with and for these target user groups for behaviour change, designers should not just focus on the design process but also focus on how to create a platform to enable such co-design action. They described a PSS method that rely on the expertise and resources from the participating stakeholders in a living lab context to deliver the intended context for research.

Furthermore, the different social, cultural, economic, and political contexts where the older adults live have significant impacts on how these solutions can be designed and implemented. For example, the healthcare experiences in China differs very much from the Netherlands, so are the requirements for healthcare prevention solutions. What can we learn from these differences and design accordingly? Pei, Sedini and Zurlo present the results of an ongoing project on improving "walkability" of the city for elderly people in Italy. To promote active aging. The initial stage of the research project is reported which consists of a thorough literature review and analysis of 31 cases.

Enjoy reading!

The Leisure Time Canvas: Eliciting Empathy for Older Adults through Activities and Hobbies

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Understanding your user's daily life and interests is essential in providing insights that can be leveraged to define new design opportunities. However, when designing for older adults, this can be challenging because, users may find it complicated to express themselves; designers may have difficulties to take their perspective and empathize with them. This paper introduces the Leisure Time Canvas, an empathy toolkit designed to facilitate older users to share stories about their activities and hobbies, to elicit their perspectives, desires and needs, and thereby inspire the design process. We report on the design of the canvas and its explorative use with six older adults and reflect on the resulting stories and design implications. This canvas aims to facilitate interaction between designers and user groups that may be difficult to empathize with or experience challenges in verbalizing their needs.

Keywords: design empathy, older adults, activities and hobbies, storytelling tool

Introduction

An increasing number of older adults want and need to live longer independently at home (Ahlqvist, Nyfors, and Suhonen 2015). The global population of 60 years and older is expected to reach nearly 2.1 billion by 2050, which is double from the population in 2017, leading to an ageing society (The Department of Economic and Social Affairs 2017). Design is one of the ways to contribute to this challenge of an ageing society, by providing concrete solutions and services (Pericu 2017). The needs and interests of older adults should be addressed to achieve the goal that 'no one will be left behind' (The Department of Economic and Social Affairs 2017). We aim to support design for prolonging healthy years, which is in line with trends identified by Stein et al. (2017) on extending well-being.

User-involvement is acknowledged to be essential in design. In research and design activities it can mainly show positive effects on 1) quality and speed of the research and design process, 2) better match between solution and user, and 3) an increased user satisfaction (Kujala 2003). Involving users in the early stages of a project facilitates exploration and articulation of problems, opportunities, ideas, and concepts (Steen, Kuijt-Evers, and Klok 2007). With this paper we aim to address the following research question: Can we support designers to make focused, personalized and meaningful designs for older adults by providing them with an empathy tool to trigger storytelling?

However, Van Kleef et al. (2005) describe three reasons to consider when gathering user's input as they: 1) may not be aware of their needs, 2) may not be able to formulate their needs and 3) may not be eager to speak about their needs. Hence users need adequate facilitation when involved in the design process. Also, users may express their preferences based on familiar products, rather than the opportunity, resulting in design process outcomes which are similar to existing ones, and possibly not optimal for the challenges at

hand (van der Panne, van Beers, and Kleinknecht 2003). It is essential to overcome these challenges because users, and especially older adults, have knowledge that designers or other experts lack (van Doorn and Klapwijk 2013). Users are experts in their own lives, but not necessarily experts in design. To bridge this gap, designers create formulations that encompass the users' goals and needs, to translate into concrete design proposals (Kujala 2003). To understand users and address their needs with design, we need to find out about their desires, wishes, priorities, and attitudes to improve the potential benefits of a design solution (Chapman, Hampson, and Clarkin 2014). This is more effective if designers do so at an early stage in the design process.

Designers and researchers can provide tools to assist the user in the position of 'expert of their own experience' (Sanders and Stappers 2008). People's hobbies and leisure time activities present an opportunity to contribute to successful ageing (Kahlbaugh and Huffman 2017) and connect to older adults on a personal level. However, there are no concrete tools to facilitate this which particularly target the context of hobbies and leisure time activities. Therefore, we developed the Leisure Time Canvas (LTC): an empathy tool designed to enable users through card sorting to share stories about their current and future hobbies and activities, to elicit their perspective, desires and needs, and thereby gain empathy for the user and inspire the design process (see Figure 1).

Figure 1: From hobbies and personal interests to design opportunities, through The Leisure Time Canvas (LTC).

In this paper, leisure activities are seen as 'preferred and enjoyable activities participated in during one's free time' (Chang, Wray, and Lin 2014). With this open discussion tool, designers are facilitated to find the drivers behind the users' hobbies and leisure activities, to learn about their values and daily lives. Also, when we better understand people's emotions and personality, we can design more personalized interventions that create potential to benefit well-being and stimulate successful ageing (Chapman, Hampson, and Clarkin 2014).

We present the LTC and explore how it supports designers to empathize with challenging user groups and their context. More specifically we provide evidence on how the LTC allows older adults to express themselves. We report on the use of the LTC together with six older adults, in one-on-one sessions with a design researcher (first author). We describe the needs and insights that were found in these sessions, through which we aim to learn about the current perspectives, daily life and engagement with the hobbies of older adults. With this contextualized information we can create more focused, personalized and meaningful designs.

Related work

It is often the case in research that participants are seen as test subjects, while in design processes design empathy is essential to see and understand people from where they stand, as persons with full lives, social networks and feelings (Mattelmäki and Battarbee 2002). Successfully creating meaningful concepts as designers or researchers largely depends on the level of understanding and empathy designers can gain for the target group (Smeenk et al. 2018).

Co-design refers to the involvement of people who are not trained in design in the design process, to creatively work together (Sanders and Stappers 2008). To be able to facilitate designers to get a better understanding of the users, researchers and designers can create tools to let users express themselves, as we draw upon Sanders' vision (2002) that all users can bring inspiration to the design process. This vision extends the perspective from Visser et al. (2005) who issues that users are 'experts on their experience'. These types of

tools facilitate empathy by getting a deeper understanding of people's feelings, dreams and imaginations (Sanders 2002).

There are several empathic methods where participants reflect on their personal experiences (Kouprie and Visser 2009), such as context mapping to understand people's interaction with products (Visser et al. 2005), generative techniques to facilitate users in making artefacts to generate a personal perspective (Stappers, Visser, and Keller 2017) and probing techniques to trigger inspirational response by maps, postcards, cameras and/or booklets (Gaver, Dunne, and Pacenti 1999). In this paper we are not focusing on tools such as context mapping as it focuses on product use, but we will elaborate upon generative techniques and probes.

Generative techniques are useful for collaborative thinking, mapping, dreaming, storytelling and envisioning (Sanders 1999). It is a participatory design language which can be used together with users early in the design process to imagine and express their ideas about living, working and/or playing in the future (Sanders 1999). However, some considerations have to be made. Lazar et al. (2018) address the importance of the materiality of the used tools, by having art therapists selecting materials to intentionally guide participants to engage with difficult emotions. By enabling people to create artefacts and explain them to peers, participants take the initiative in driving the direction of the study and as such prevent blind spots for the designer (Stappers, Visser, and Keller 2017).

Probes as a user engagement concept, originated by Gaver et al. (1999) are used to explore the design space. A probe offers boundaries to let the user creatively contribute to research in an open and sharing way (Wallace et al. 2013). With probes, the participants are given the initiative, as instead of answering a precisely framed question, it is about generating them (Stappers, Visser, and Keller 2017). Users may have different levels of creativity, and through probe theory, these can be approached in four ways: doing, adapting, making and creating (Burrows, Mitchell, and Nicolle 2015). Especially, empathy probes can provide insights into users' experience in their daily life (Mattelmäki and Battarbee 2002). An interesting example is the use of cultural probes to co-create a digital neighbourhood guide for and with older adults, important aspects such as mobility and personal limitations were found (Jarke et al. 2017).

The most significant difference between generative techniques and probes is the mindset. Probes are evoking inspiring responses which designers use, while generative techniques are used in a more steered process, making understanding explicit (Sanders and Stappers 2014).

With the LTC we differentiate ourselves from probes by positioning the tool between the design and the user in a session, instead of the user executing the probe independently (alone). Furthermore, exploring a specific technology or intervention is not our main scope. Instead, we steer the discussion as with generative techniques, focusing on what characterizes a person via their leisure activities, hobbies and activities to inform the design space for a particular user group. This can lead to new questions, insights, opportunities or perspectives on existing problems.

Leisure Time Canvas

Here we discuss the canvas design, the participants, context and method.

Canvas design

Hendriks et al. (2015) pointed out that it is necessary to provide the rationale behind a tool for purposeful implementation. Thereby we aim to enable other researchers and designers to adapt and expand this tool. With the Leisure Time Canvas we want to provide older adults a playful tool to discuss their activities. The LTC is a template consisting of three columns to sort hobbies and other leisure activities on (see Figure 2), the columns state from left to right: 'does not suit me', 'I like doing this' and 'I would like to do more often'. The participants were given a pile of cards with common activities and hobbies for older adults, displayed by an icon and corresponding name of the activity. Then they had to sort these activity cards according to their preference onto the canvas. The purpose of dividing the cards into three different places is to make the users aware of their perspective on these activities, and reflect on how they engage with them in the past, now and possibly in the future. Besides the pre-made cards, several blank cards were given to the participant to write down missing hobbies or activities that they might engage in. Afterwards, the researcher discussed the resulting 'palette' with the participants, with a primary focus on the barriers they experienced with the category 'I would like to do more often'. This conversation resulted in rich contextual stories about people's drivers, barriers, and routines regarding their hobbies.

Figure 2: The Leisure Time Canvas to facilitate the user's storytelling about their hobbies.

The hobby and leisure activity cards were chosen based on the Pleasant Activity List (Roozen et al. 2008) including social activities, domestic activities, culture/science/travelling, intimacy/personal attention and diverse activities resulting in the following eleven cards: reading, walking, visiting a museum, playing games, cooking, listening to music, drawing/painting, cycling, gardening, meeting with family/friends, making a city trip. Corresponding icons were chosen to make it playful and provide concrete visual examples, inspired by the enthusiastically received probe packages created by Gaver et al. (1999) also targeted at older adults. Our tool was discussed with other researchers both with icons and photographs on the cards, but it was decided to use icons to on the one hand remove the focus on details of a specific brand and on the other hand remove the context details so it would be more applicable to a larger group. For other target groups, the set of cards can be adjusted.

The card sorting interaction was chosen based on the redesigned semantic differential (Branco, Quental, and Ribeiro 2017) on which the users provided positive and negative adjectives which should be placed on a scale of intensity, to evaluate how the user characterizes their experience while playing a game. As it proved to be an understandable task for older adults with dementia, we used a similar interaction and mapping style for the LTC but instead used it to facilitate a conversation rather than evaluation.

LTC is a social tool that is used in the interaction between the designer and the user to stimulate sense-making and facilitate a meaningful conversation. Older adults may experience barriers when explaining their needs (van Kleef, van Trijp, and Luning 2005), and we assume we can make this easier by talking about something they like or are passionate about. In this way, we facilitate the users to choose and steer the conversation through the LTC, as they have the freedom to elaborate on specific activities they resonate with. The tool thereby allows the designer to get a deeper understanding of the particular motivators and values of the individual users.

The canvas was used in four different cases so far, on which we will elaborate and specify our learning. First, in a group setting where 28 older adults participated in a workshop led by two design researchers. This triggered discussion between the participants, yet the outcome (a picture of every canvas) lacked the stories, the important contextual knowledge. Second, five design students used it with two older adults and specified the tool even more to their context by for example zooming in on specific cooking tasks together, which showed the potential to use it within one hobby as well. Third, during a summer school in China 30 design students practiced the tool with each other and although this helped them to design for a particular user, the stories lacked depth contextually and emotionally. Fourth, it was used in a similar setting as with this paper, with 6 participants in a one on one session between design researcher and older adult, to determine the direction to develop a smartphone application based on people's interest. To summarize, it shows most potential in a one on one interaction between design researcher and target group.

Participants, context and methods

The toolkit was used together with six (1 male, 5 female) independently living older adults, aged 61-78 years (one participant was unwilling to provide this info), in a session between the user and the researcher. All participants (Table 1) were recruited via a smartphone training class and signed a consent form. All sessions were held in April 2017, in a community building, and lasted between 20 and 30 minutes.

Table 1: Demographics of our six participants who used the Leisure Time Canvas.

Participant	Gender	Age	Living situation
Amy	Female	61	Living together with partner
Dorothy	Female	73	Living alone
Ella	Female	71	Living alone
Frederick	Male	76	Living together with partner (Tamara)
Patty	Female	-	Living together with partner
Tamara	Female	78	Living together with partner (Frederick)

The sessions were audio recorded, and a thematic analysis was done following the steps defined by Braun and Clarke (2006). We transcribed the interviews to familiarize ourselves with the data. Then we generated initial codes across the six interviews, which resulted in 38 codes, some examples include: busy, choir and husband. From these 11 were selected to be most present with all participants, such as independence, insecurity and routines. We browsed through the data with a different lens again, so instead of finding commonalities, we structured quotes (including positive and negative label) in a table per participant in past, present and future. Then this table was colour coded by the initial codes and from this, three themes became apparent, because of extensiveness of a story (including who, what, where, how often) and emotional attachment to a story (impacting life, life changer). We will elaborate on these in the next section.

Result and analysis

We analysed six sessions and report on those by 1) describing three common themes, 2) addressing the diversity within these themes and 3) reflect on the insights for design.

Common themes

Lack of people to engage with in activities while having an existing social network

Amy, Ella and Dorothy expressed they each had individual hobby ambitions, but did not feel like going alone. This is their perspective on the situation as they feel like because they currently do not have somebody for this hobby ambition, they do not perform the hobby, while they do have the desire for it. For example, Amy is part of the gymnastics club, a choir, a woman association and an elderly association, but does not want to go by herself to a museum. Ella is board member of the choir she is part of and would like to walk at the sea more often, but does not feel confident to go alone. Dorothy goes cycling every 2 weeks with an elderly association, but she feels insecure to attend activities alone, such as walking through the forest. Interestingly, they are all part of several social communities, but may not perceive them as an option to go together with. Yet, it could be they indeed do not have similar interests in a particular hobby, as one participant mentions having different hobbies from his partner: 'the dog is more my wife's hobby'. We will continue to interpret this through a design lens and address this in the design for personalisation section.

Impactful experiences limiting or promoting engagement with an activity

What impressed us is the dedication with which some participants execute a hobby or certain activity for several decades already. Although this depends per person, most people may not have had one hobby as long as an older adult. And if an older adult builds up a routine over a long time, he or she may not be very likely to change this, unless certain factors cause this change. For example, serious life events might influence one's engagement in hobbies and activities: Frederick's wife recommended him to start playing bridge after he could not play soccer and tennis anymore due to his knee surgery. So, this means serious life events can both

facilitate and set a barrier to engage with hobbies. Because reduced time invested in hobbies can result in less social contact as well, it is important to find meaningful alternatives.

Stereotypical hobbies and activities for older adults

We have found an interesting contradiction in perspective on 'elderly hobbies': Frederick said 'I have old people's hobbies' while Ella mentioned that she moves away from 'the grey-headed hobbies'. These quotes show there is particular perspective of one's own hobbies, and hobbies that are common in the community. It is an interesting contrast that Frederick accepts the change of hobbies to things that better suit his needs, while Ella desires not to change her hobbies and does not want to be associated with these. Potentially people need support in making these decisions to start with a new hobby, or can benefit from inspiration for what is on offer in a community. For example, in the case of Ella, her opinion may change when trying out a certain hobby or knowing who else is participating. This is knowledge and experience which indeed only older adults have, as designers cannot predict this view for every individual.

Diversity within findings

Yet within these common findings, there certainly are different specific and individual reasons and contexts for making decisions. For example, in terms of not wanting to walk alone. For Amy, this is because her husband is not interested in visiting a museum, while for Dorothy and Ella it comes from anxiety to not go to the forest or sea. This illustrates that people have very individual needs and perspectives (see Table 2), and need to be respected as such when we design for this target group.

Table 2: The commonalities and diversity of our participants.

Participant	Commonality	Diversity
Amy	Cycling, knee injury	Cycling instead of walking, because of her knee injury.
	Alone	Her husband is not that interested in a museum card and she does not want to go by herself.
Dorothy	Cycling	Cycling every 2 weeks (routine).
	Alone	Because she got lost in a forest once, she does not dare to walk there alone anymore.
Ella	Cycling	Cycling with good weather.
	Alone	Because of a severe nose bleed, she got anxious and won't go by herself anymore into the forest.
Frederick	Cycling	Cycling instead of soccer and tennis.
	Knee surgery, playing bridge	Dropped previous hobbies and his wife motivated him to start playing bridge after he came out of the hospital.
Patty	Cycling	Cycling yearly with family, monthly with sisters and ever 2 weeks with elderly association, on Sundays with her husband. Strong drive to stay active.
	Knee surgery	The recovery went really well and her drive to stay active was high.
Tamara	Cycling	Cycling as summer activity.
	Alone, health	She does not feel able to travel anymore such as her trip to Brazil, due to health reasons and needing a travel buddy.

Design for personalization

Now that we have identified the diversity and commonalities for the perspectives of the six older adults, we want to address how this influences the design space. Potentially older adults may benefit from facilitation in finding people with similar interests to engage in activities with, because they may experience barriers to step outside their comfort zone and join new activity groups. In addition, by being aware of the reasons which

promote or limit doing a certain hobby, such as routines and peers, we can bring these into a design as well. This illustrates how designers could elicit new design opportunities by using the LTC.

Amy desires to go to a museum more often: 'I once said I would love to have a museum card, but my husband is not that interested in it. And to do it by yourself… you don't do it that often. At least, not me. But it would be very nice!'. She also addressed having a busy schedule: 'We are quite busy these days. I babysit the grandchildren, that's already two days a week. And you also have to do your house and garden.'. Thus, perhaps we can design a service to make Amy aware of the cultural possibilities in her neighbourhood (decreasing travel time), so she can merge it into her current life. Also, we might design a tool to find a match with someone else in her community to visit the museum together. This might add to address issues of loneliness in elderly communities.

Dorothy feels insecure to go somewhere alone since her husband deceased, and this decreases the number of places where she still goes: 'I really do not drive to the big city, it is because since the moment I was alone, I became much more insecure.' She even got lost once while walking, increasing this insecurity: 'I chose for a less crowded road but then went this way and that way… and I completely got lost… no one came by… I did not know where I was. After a while luckily, a mountain biker came by and showed me how to get back. Since that moment I do not walk in the forest alone anymore.'. Thus, perhaps we can use design to give Dorothy a feeling of security/safety in the forest by connecting her to someone, or facilitating easy access to others through technology.

Ella desires to go to the sea more often, but feels scared as well to go alone: 'I would like to walk more next to the sea, but it is so far away. And you have to take someone.' and '1 ½ years ago I had a severe nose bleed and it took so long to get back to the car… like… really long. And I am a bit stressed out, scared. I even did not dare to get out of the house for a while, so to speak. I used to go into the forest with my dog, walking or cycling, but my psychologist said better not to do it by yourself, so I only choose routes where many people are.'. Thus, perhaps we can provide her with a feeling of comfort to start feeling at ease to go by herself, or we use technology to emulate the experience of going to the forest or sea by virtual means. Or trigger to find a match with younger people to go to the beach together, in return for teaching them something she learned over the years.

Frederick enjoys the freedom of choosing his activities: 'I never have difficulties in planning things, because I can simply cancel an afternoon or evening. You are your own boss eh.' and 'I learned to play bridge when I came out of the hospital [knee surgery]. At the start really limiting… damn I could not do anything anymore. But my wife motivated me to do so.'. Thus, perhaps Frederick would have liked a service which gives potential hobby suggestions to him, if his wife did not come up with the idea. On the other hand, it is still important to stay physically active for Frederick, so perhaps design could trigger in a playful way to stay active when one is no longer able to compete in soccer or tennis.

Patty has a strong drive to be busy and active: 'The recovery [knee surgery] went really well, because I thought what if I cannot go cycling and walking anymore! Home all day! What would I have to do then?'. Furthermore, she cycles on many occasions: 'I enjoy cycling as well. Once a year we go cycling for 50 km with the whole family. We have been doing that for 25 years already. Together with the elderly association once every 2 weeks. And once a month 40-50 km with my sisters (during winter walking – a local event), we have been doing that for 15-16 years already. Every time a different route, time flies! People are impressed we still keep up. And on Sundays whenever it's good weather, with my husband. I love it!'. Thus, perhaps we can create a service to let her map out the directions of the cycling tours, and meet others that are cycle enthusiasts. Or giving Patty a tool to provide insight in the frequency and duration of her activities, as she is competitive about her physical activity.

Tamara has the desire to travel: 'Because my husband does not like travelling, I visited my oldest sister in Brazil together with my daughter three years ago. Lots of fun! My daughter arranges the travel herself.' and 'To be able to make such travels [Brazil] you have to be healthy and have somebody who joins and that's not the case anymore. So, we'll go on a weekend trip in The Netherlands…'. Thus, perhaps we can trigger to find a match with someone else to travel abroad or find ways to improve travelling individually for older adults, if she feels healthy enough to go travelling.

Discussion

With this paper we aimed to address the following research question: Can we support designers to make focused, personalized and meaningful designs for older adults by providing them with an empathy tool to trigger storytelling? Our findings reveal barriers and motivators of hobbies and leisure time activities, which can serve as specific characteristics to address in the design. These were found through applying the LTC, which allows participants to reflect on their activities in the past, present and future. Additionally, it revealed with whom, when and how often they executed these, giving the designer an empathic view on the context of their participants.

Supporting designers through the LTC to empathize with older adults

The stories generated through the LTC indeed provide us with rich contextual data to understand the user and generate creative input for the design process. Though the designer makes the final call on prioritizing what characteristics to keep and share with others, and what lens to take in engaging with the user. On the one hand, it is the designer's freedom to pick quotes which he/she resonates with and sees potential for continuation. On the other hand, this means not including the user fully in the co-design process, because the user cannot steer the findings and check misinterpretations. Therefore, we are interested in exploring the area of co-analysing the interpretations with the user similar to Doorn et al. (2013).

Furthermore, we found that social context has a major influence on which hobbies and activities are undertaken. Not having people to do activities with, limits acting on hobbies and similarly having people with similar interests promotes engaging with hobbies on a regular basis. Righi et al. (2017) argue this 'turn to a community' as well stating that when designing technology for older adults, we should say 'their community'. We are indeed not only creating a design space for an individual, but also for the people currently in their stories and even non-existing relationship which may be built through (new) design solutions. Furthermore, previous (traumatic) experiences can limit executing a hobby they would expect to enjoy. By knowing individual characteristics, we can create tailored designs while balancing barriers and motivators.

While having commonalities such as cycling, the driver to execute a hobby and the routine can be diverse and highly individual. For example, from Amy's and Frederick's perspective cycling is a replacement activity for a previous hobby, while Patty had many cycling occasions together with others and the strong desire to remain doing this: 'What if I cannot go cycling and walking anymore! Home all day! What would I have to do then?'. Therefore, we should reflect on people's hobbies in the past, present, and future, and on a personal level to be able to understand to what extent certain activities are more meaningful than others. Perhaps we can as designers learn which elements of a previously enjoyed hobby we can use in a new design. This illustrates that we cannot design for all older adults in general terms, but that we can distil trends from specific users to design personalized interventions and services.

However, the view of finding meaningful data may be influenced by our belief in the value of gaining empathy in design. Results of the LTC can be unsatisfying when designers do not see the advantages of empathy in design or do not know how to engage with it (Kouprie and Visser 2009). The data analysis is therefore influenced by the designer/researcher who interprets the data. Though our canvas addresses clear design spaces to continue working with, and thus we argue for using hobbies to understand users on a more personal level and as input for design.

The earlier identified challenge that users reflect on familiar products which might result in more 'sameness' in design (van der Panne, van Beers, and Kleinknecht 2003) can be addressed by reflecting on leisure time activities as this has an open mindset and focuses on doing the activity rather than using a product. Also, by segmenting the stories into past, present, and future, gaps can be identified: what did a person use to do? What does a person currently enjoys doing or has been doing for many years? What does a person argue for willing to do in the future, but feels a barrier limits him/her? By putting these next to each other, experiences with different hobbies and activities can be compared and more accurately valued by the designer. We believe the follow-up step should be to not only show empathy in learning about the user, but also in analysing and designing with the user. Evaluating design concepts has been done before by van Doorn et al. (2013) addressing children becoming co-researchers, yet we are interested in to what extent this could be applied to older adults as well.

Supporting older adults to express themselves through the LTC

To summarize, the problem identified by Van Kleef et al. (2005) was three-fold namely the user: 1) may not be aware of their needs, 2) may not be able to formulate their needs and 3) may not be eager to speak about their needs.

Amy and Ella explicitly mentioned a concrete need, vocalized through their hobbies and interests, and for the remaining participants, we interpret this from their stories. By the description of their activities and events in their daily life, we were able to extract drivers. However, the storytelling experience of our participants may come even more to live when we would ask participants to bring artefacts to the session (Nassir, Leong, and Robertson 2015 and Leong and Robertson 2016) or if we would have the session in people's homes, because people may feel more at ease to participate in the design process (Suijkerbuijk et al. 2015).

We argue that the user is facilitated through the LTC to formulate their perspectives and needs because they all were open while elaborating on their activities in their daily life in a brief session. Dorothy and Ella, for example, feel the need whenever they want to go for a walk; they want company as they do not dare to go alone. Tamara has a similar feeling but then in the context of traveling. Patty expresses a strong desire to keep her independence. Frederick currently does not seem to show a need for change, as he feels like he can do whatever he wants and feels free (this may be his need). Amy expresses the need for a to have someone to go to a museum with together.

Furthermore, we argue that the user with the help of our canvas was eager to speak about their needs, even including unrequested and personal topics such as surgery, anxiety, and people who deceased. These are somewhat surprising findings to us as we do not explicitly ask to discuss these topics. We see, however, in a similar study based on personal stories that participants do point out big events during their lives, although we cannot say if this is initiated by the participant or by the researcher in the semi-structured interview (Orth, Thurgood, and van den Hoven 2018). Yet, apparently, our participants felt these were related topics for them and felt the need to bring these up. As the older adult steers the conversation, they may feel more at ease to highlight the things they feel comfortable sharing. This is relevant for design because, as much as identifying the drivers also the barriers are meaningful to be aware of to get a complete understanding of a user. If we map this information onto Fogg's behavioural model (2009), we can see that Amy has a high motivation to go to a museum, but does not feel able to do so because her husband is not interested and she does not want to go alone. Resulting in that in a design for Amy, we should address the need to empower her, providing her the confidence to go by herself or actively search for a museum buddy.

We see an improvement in the method to stimulate the awareness of needs more towards the user, instead of the designer interpretation. If the canvas would include the structure past/present/future already, the user may map his/her hobbies more consciously and explicitly onto a timeline. Perhaps newer/different hobbies can be added to be included for the future part. Also, we may trigger discussion further if we make more detailed cards, as Kankainen et al. (2011) did with their postcards to trigger storytelling about mobile phone experiences. It would be interesting to explore more to what extend the storytelling is open and initiated by the participant as there are also examples such as co-constructing stories (Buskermolen and Terken 2012) where the designer tells a fictional story and then asks the user whether or not he/she recognizes this and why. This facilitates personalization of the cards so it can convincingly fit a participant, rather than aiming to be an all-encompassing general term on the card. The concept of using activities and hobbies shows potential, and could even be explored in other domains such as their social network, favourite objects in the home or memories to elicit specific design opportunities.

Conclusion

We contribute the LTC to facilitate empathy with specific user groups in the early stages of the design process. Also, the user is facilitated to provide rich contextual individual stories through their leisure activities in an effective way. With this, the designer can frame a new design space based on the personal contexts of the users' hobbies and leisure time activities.

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Designing for Older Adults' Life Storytelling through a Tangible Interactive Device

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There appears to be a mismatch between current interactive media and intergenerational storytelling, which leads to the elderly are often viewed as passive consumers, rather than active creators of story content. In this paper, we present our study aiming to facilitate storytelling of older adults living in the care facilities with their children, driven by the research questions: *RQ1: What life stories would the older adults like to share?* And *RQ2: How to facilitate older adults to tell stories with their children?* A research prototype named Slots-story was designed, which integrated functions of memory cue generator, story recording, and preservation. In the field study, eight pairs of participants (each pair consisting of an elderly adult and his/her child) were recruited to use the prototype for around ten days. Semi-structured interviews were conducted both with the elderly and their children. Stories collected were transcribed, and thematic analysis was conducted, which formed the foundation of the insights on the research questions.

Keywords: Elderly, storytelling, tangible interface, social Interaction

Introduction

Storytelling plays a fundamental role in human communication. From a hermeneutic point of view, human life is a process of story and narrative interpretation (Widdershoven, 1993). For the elderly, intergenerational storytelling improves psychological well-being, reduces feelings of loneliness and depression of them (Driessnack, 2017). For their children, intergenerational storytelling contributes to the development of a strong sense of intergenerational self, which is associated with children's increased resilience, better adjustment, and improved likelihood of overcoming challenges (Fivush, Bohanek, & Duke, 2008). Given that multiple participants across generations not only co-narrate their shared stories but also jointly evaluate them, intergenerational family storytelling becomes important to identity development (Langellier, 2011)(Peterson & Langellier, 2006). Preservation of life stories is also necessary as they are an important part of identity preservation. The elderly hope they will be remembered, however, when the elderly passed, their family members are only left with bundles of images, materials, objects, and wishes of the deceased (Whittaker, Bergman, & Clough, 2010).

Our target group was older adults living in the care facilities and their children. According to our previous study, these user group mostly they couldn't operate computers or smartphones (Li, Lin, et al., 2018). This was because they were unfamiliar with digital devices and lack of using experiences, as well as suffering from physical decline. Most interviewees suffered from age-related declines, such as fading eyesight, losing flexibility in hands, a lack of mobility. They obtained information mainly by TV and Newspapers.

While social media like Facebook and Twitter help to share and preserve the stories to some extent, these platforms are more about the "now" moments and less about the past moments (Marcus, 2015). In addition, the elderly are still disconnected from the mainstream social circles due to lack of technology and devices that resonate with them (Waycott et al., 2013). Currently, most interfaces are designed to support younger users. Thus, they are confronted as passive consumers rather than active creators of content (Brewer & Piper, 2016).

In this paper, we describe our explorative work, focusing on prompt older adults to share and preserve their life stories with their children. Knowledge and insights were gained by the implementation of the prototype. Contributions of this paper lie in: A better understanding of elderly people's preference for life story themes, and concrete strategies and insights on facilitating intergenerational life storytelling and preservation for the elderly. In related work section, our literature review allows us to identify the stated research and design focus.

Related work

Multiple Functions of Storytelling of the Elderly

From a physiological perspective, reminiscing and sharing of life stories improve self-esteem, mood, well-being and enhances feelings of control and mastery over life as one ages. Research has also associated reminiscence with improving psychological well-being, reducing feelings of loneliness and depression, and helping older adults find meaning in their life (Driessnack, 2017). From a social perspective, stories transmit cultural and individual traditions, values, and moral codes (Kemper, 1984). Stories told by the elderly create meaning beyond the individual and provide a sense of self through historical time and in relation to family members, and thus may facilitate positive identity (Fivush, 2011). From a broader perspective, stories told by the elderly are treasured intangible source of cultural heritage. When individuals regard that they approach the end of their lives, they tend to document segments of their personal history and issues of generativity and knowledge transmission to younger generations are considered as significant to seniors (Unruh, 1983).

Practices of older adults' story sharing

Given that one of the most precious characteristics of older adults is their memory of events, people and places during their childhood and adolescence (Dryjanska, 2015), older adults could be deemed as story content producers. Jenny Waycott et al. further investigate the nature and role of digital content that has been created by older adults in the care facilities, for the purpose of forging new relationships, and their findings demonstrate that older adults are willing to express themselves creatively through digital content production (Waycott et al., 2013). We build on this idea and extend it into intergenerational story sharing.

Applications of storytelling for the elderly

On the application side, in terms of applications and tools for the storytelling for the elderly, there is a system aiming to helps residents in care facilities make connections through sharing stories (Linnemeier, Lin, Laput, & Vijjapurapu, 2012), game-based reminiscence service that enables elders to capture memories and annotate photos(Lee et al., 2014), design of encouraging reminiscence and storytelling with objects, as a tool for building connections of older residents in care facilities(Bennett et al., 2015), an interactive table for sharing memories, skills and demands(Giorgi, Ceriani, Bottoni, Talamo, & Ruggiero, 2013), and a system aims to make the elders feel more connected to the outside environment, and further facilitate their sharing of stories with citizens from local communities(Li, Lin, et al., 2018).

In terms of intergenerational storytelling, current applications are mostly smartphone applications or website, which are inaccessible for elderly users. There are smartphone applications or webs for creating multimedia stories (Druin, Bederson, & Quinn, 2009) (Bentley, Basapur, & Chowdhury, 2011b), a software of managing family stories(Marcus, 2015), software for videos to be saved in user-specified real-world locations, shared with friends and family(Bentley, Basapur, & Chowdhury, 2011a), and a software support digital reminiscing of the elderly(Thiry & Rosson, 2012).

Since TUI (Tangible user interface) has been identified by Spreicer as having great potential to improve older adults' acceptance of technology acceptance (Spreicer, 2011), applications that support story sharing for non-tech-savvy older adults mostly adopt tangible interface. There are applications focus on improving older adults' connections with other fellow residents: a tangible system aiming to help residents in the care facilities

make connections with their fellow residents through sharing stories (Linnemeier et al., 2012). Using landscape tangibles as proxy objects to aid storytelling and reminiscence for older people in care facilities (Bennett et al., 2015). There are applications focusing on improving their connections with people outside: *Interactive Gallery*, a tangible installation placed in care facilities aims to facilitate story sharing between older adults and citizens from local communities (Li, Lin, et al., 2018).

Summary

The literature indicates that storytelling benefits the elderly from the physiological, social, and a broader perspective. We focus on older adults' life stories, and we particularly adopt trigger questions as memory cues. We probe how to provide the older adults explicit memory trigger questions through a tangible device and bring them an enjoyable using experience. Since our target group is non-tech-savvy older adults in the care facilities, we also build on tangible interface to bridge the technological gap for older users. In the next section, we introduce our prototype in details.

Design intervention

We based the design of Slots-story on our previous work-in-progress work (Li, Hu, Hengeveld, & Hummels, 2018). Its design process included an interview study. The following is a summary of the interview. We found the elderly were unfamiliar with digital devices and lack of using experience. They had regular contact with children, who were almost the only people that the elderly could really tell personal things to. Nostalgia was prevalent among the elderly and they would like to share their life stories, but they were rarely asked specifically, which made the stories hard to preserve. Currently, life story sharing was fragmented and happened unconsciously. The younger generation was lack awareness of the elderly's stories. Memory triggers were necessary to facilitate life storytelling, and their life memories were recalled by conversation topics, family mementos, etc. Given that the meeting time of the young and the elderly was limited every week, we could also consider separating the process of storytelling and story listening. We then conducted brainstorm, sketch and mock-up, and user consultation, and the resulting design was Slots-story (Figure 1).

Prototype: Slots-Story

Based on the above design requirements, Slots-Story is designed. The metaphor of slots-machine is applied in it. Slots machine is operated by one lever on the side of the machine and is familiar to most elderly people. When the user pulls the lever, a trigger question is displayed in a similar fashion as slots-machines. It consists of a slots-machine-like device and a flash disk, and it could either be used face to face or independently by the elderly and their family members.

Appearance: For ease of use and ergonomic purposes Slots- Story is wedge-shaped, making the display easy to see, and lever and buttons easy to access. A 7-inch display and a microphone are arranged on the upside and a button is on the front side. The handle on the back, together with a portable dimension, makes it easy to carry. The MDF material is covered with a wooden laminate texture, making it look slightly old-fashioned, which is in line with the aesthetic taste of the elderly.

Figure 1: Slots-Story prototype, and question and recording interfaces

Display Interfaces: Slots-story includes two display interfaces: the "Question interface" and "Recoding interface". Vintage style is also applied both in the interface elements and fonts. Considering fading eyesight of the elderly, bold and huge fonts are used for the text. There are also usage tips at the bottom: Press "REC/STOP button before/after recording.

The "Question interface" displays one specific question, which could be switched to Next/Previous question by pulling down/pushing up the lever. The "Question interface" will be switched to "Recoding interface" if the

REC/STOP button is pressed. In the "Recoding interface", a dynamic recording icon is placed to provide real-time feedback.
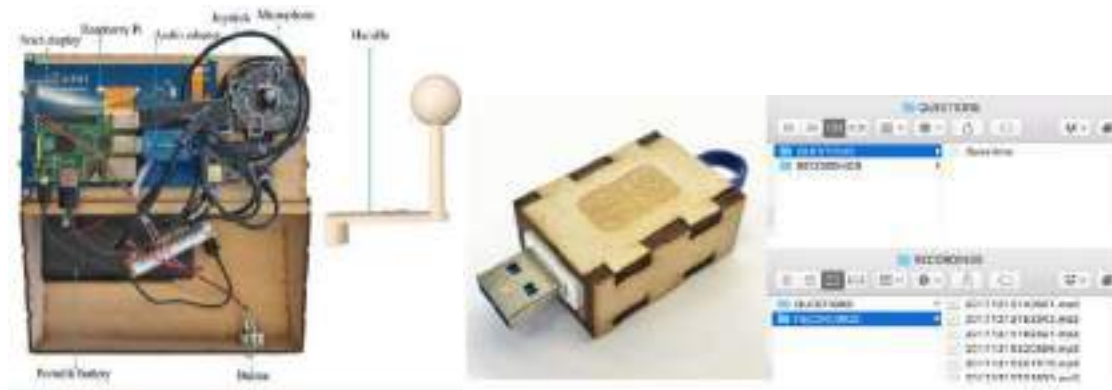
Figure 2: Hardware of Slots-Story prototype, Flash disk and question and folders inside

Interaction: The interaction process is: (1) The young inserts flash disk into the prototype and gives it to the elderly. (2) The elderly operates the lever to switch trigger questions. (3) The elderly pushes the button to start recording. (4) The elderly pushes the button again to save the recording. (5) Stories told by the elderly now are in the flash disk. (6) The young Plugs the flash disk into a computer to listen and keep stories, and further modifies trigger questions. (7) The slots-story could also be used face to face.

USB Flash Disk: The flash disk is not only used to store the trigger questions and preserve the story audios. There are two folders in it: "QUESTIONS" and "RECORDINGS", the former contains a text formatting document, the latter contains all the story audios told by the elderly.
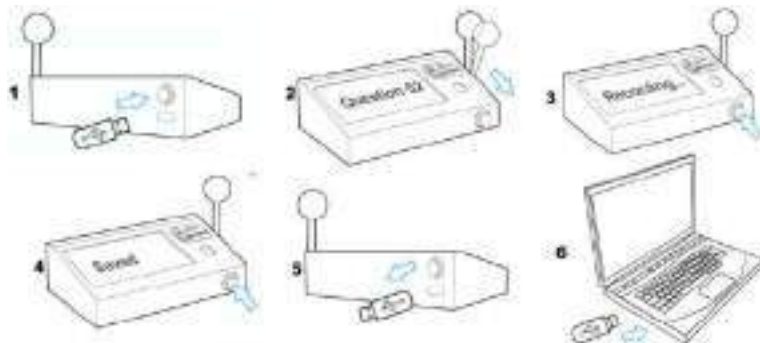
Figure 3: Operating procedures

Trigger Questions of Different Themes: Explicit questions are employed as memory cues (Table 1). Compared with other types of memory cues, questions are more explicit and straightforward, and targeted answers will be triggered. Trigger questions in our case are from The Life Story Interview(Atkinson, 1998), questions cover most aspects of an entire life course, including childhood, family, school, work, friend, historical events, and others, which are arranged within a thematic framework chronologically. Additionally, considering the emotional consequences when recalling deep memories, we avoid adopting negative topics.

Table 1: Trigger questions in Slots- Story

Childhood	Friends and Fun
Were you ever told anything unusual about your birth?	What childhood or teenage friendships were important to you?
What is your earliest memory?	Did you make friends easily?
What was the most significant event in your life up to age 12?	What special people have you known in your life?
What clubs, groups, or organizations did you join?	Did you have a steady boy or girlfriend in high school?
Did you have any dreams as a child? As an adolescent?	How do you use leisure time?
Family	What did you do for fun or entertainment?
What was going on in your family and the world at the time of your birth?	**Historical Events**
What beliefs or ideals your parents tried to teach you?	What historical events did you participate in?
Are there any family stories told about you as a baby?	What is the most important historical event given to you by your family?
What characteristics do you remember about your grandparent?	What has your life contributed to history of your community?
How would you describe your parents?	Do you remember what you were doing on the days in World War II?
Did your parents spend enough time with you? What did you do with them?	Do you recall any legends, tales, or songs in your community?
School and Work	**Others**
What is your first memory of attending school?	Do you remember your first date? Your first kiss?
What was your first experience of leaving home like?	What gifts (tangible or intangible) are still important to you?
What are your best memories of school?	What were the crucial decisions in your life?
What accomplishments in school are you most proud of?	What has been the happiest time in your life?
Is there anything that you miss about your work?	How would you describe your worldview?
What is the best part about being retired?	What have been your greatest accomplishments?

Field Study

As previously mentioned, we want to explore the possibilities of facilitating the elderly to tell life stories through the implementation of the Slots-Story. Therefore, the research questions addressed in this paper are: *RQ1: What life stories would the older adults like to share?* And *RQ2: How to facilitate older adults to tell stories with their children?*

Figure 4: The process of story sharing

Procedure

Overview: In the field study, three same prototypes were made and were distributed to participants. Each set of the prototype was provided with an instruction for use. Eight pairs of participants (each pair consisted of an old adult and his/her children) were recruited. The older adults were from local Dutch care facilities. Purpose, functions, and operation procedure were first introduced to them, and then they were interviewed. After that, each pair used the prototype for around five days. After they used the prototype, interviews were conducted with them again. All the interviews were audio-recorded with the interviewees' consent. Interviews and story audios were then transcribed and analyzed.

Participants: eight families, the age of the older adults ranged from 63 to 86. There were four females and four males, and their marital status were: five married, living with a spouse; three widowed. They agreed to share their audio recordings. None of them reported any significant physical impairments. The age of their children ranged from 38 to 43.

The first round semi-structured interview

Interview questions: Semi-structured interviews were conducted twice, before and after the implementation of the prototype. The aim of the first interview was to understand the actuality of intergenerational storytelling of the elderly. All interviews were analyzed by a qualitative, grounded theoretical approach, informed by situational analysis, to inductively analyze our data and generate the findings (Charmaz, 2014). Interview questions of the first round were as follows. **Basic Information:** Age, gender, physical condition. **Communication with family:** Way of keeping in touch (face-to-face, phone, skype, etc.). **Current story sharing situation:** Whether they like to share stories, and why. **Situations and reasons for sharing stories:** Who, when, how to share stories (face-to-face, phone, skype, etc.). Topics, duration, and frequency of story sharing. The trigger of life story sharing. Problems encountering during story sharing.

Findings

Communication with Family Members: Firstly, they had regular contact with children, but wanted more: "Sometimes they eat here when they visit me, it is the coziest moment, and I like that." "I want they could visit me more often, but I don't call my children very often because I don't want to disturb them, they have to work after all." Secondly, Family members were almost the only people that the elderly could really tell personal things to. Although talking topics were various: daily lives, sports, weather, politics, etc., and they were mainly about the family that was private and personal.

Current life story sharing situation: Firstly, nostalgia was prevalent among them: The elderly interviewee became emotional and depressed, and would like to recall their past. The first reason was that they could not do some things they could before. The second reason was they tended to be nostalgic naturally when aged: "Past things come to my minds somehow. After I grew old, I often look back to my life and feel life is short." "I don't understand the society of today, and I miss the past." Secondly, the elderly would like to share their life stories, but they were rarely asked specifically: The elderly would like to recall their past, but they were not asked very often, nor did they have many chances to tell the stories. "I myself would like to recall the past. My children almost never ask about that specifically." However, the younger were to lack awareness of the importance of elderly's stories: Life stories of the elderly were seemingly ignored by their children. It was not the young were uninterested in the past of the elderly, but that they were lack of awareness of it. The young realized its importance only when the elderly passed away. Thirdly, currently life story sharing was fragmented and happens unconsciously: The elderly didn't share life stories specifically and deliberately in daily lives. Situations and reasons for sharing life stories were various. For example, when the conversation topics were related to their past, it acted as memory triggers to remind them. In brief, Life story sharing was fragmented and happened casually and unnoticeably, making life stories hard to preserve.

Problems encountering when sharing life stories: The biggest problem for storytelling was lack of topics. Secondly, as most elderly interviewees felt their lives were ordinary and nothing special, their concern was that others might not be interested in their life stories: "I guess those successful or rich people would like to tell their life stories. For us ordinary people, there is nothing worth telling." Next, some of them were emotional, and they might weep when recalling deep memories, which would be embarrassing. Finally, the interviewees were suffering from memory decline.

The second round semi-structured interview

Interview questions: The aim of the second interview was to evaluate the prototype. The interviews were semi-structured and based loosely on the following questions.

Validity: Would you like to use it? Who would you like to share with? Do you think it could facilitate sharing stories? Why?

Contents: Preference for questions A. Childhood B. Family   C. School and work D. Friend and Fun E. Historical Events G. Others

Interaction: Do you understand the concept of the prototype? Do you find it easy to use? What is the most difficult part? Which part do you like/dislike most of the prototype? Why? Do you find it easy to use? What is the most difficult part? Which part do you like/dislike most of the prototype? Why? **Other**: Would you like to use it face to face/over a distance?

Comments for improvements: While the interviews with the young were based loosely on the following questions: What's your feeling after listening to the stories? Did you contact parents after listening to the stories? Preference for stories: A. Childhood B. Family   C. School and work D. Friend and Fun E. Historical Events G.

Findings of interview the older adults

Validity of the prototype: With respect to validity, the interviewees thought it could facilitate life story sharing. The prototype helped them to remember what they almost forgot, as well as giving them a chance to save memory. One interviewee said:*" It helps me to reflect on my own life again. I could remember something I've nearly forgotten."* They also enjoyed the process of recalling: *"I had a lot of fun recalling and telling my own memories, experiences, and feelings."* The elderly also benefited a lot from recalling the past as they got insights from it:" *The questions give me insights into the past as well as mistakes and reactions of people who are very close to me."* The elderly also thought the story recordings also benefited next generations:" *I would like to have such a device for my grandfather, because I don't even know his name."*

Preferences for the topics: Most of them would like to talk about their childhood, especially the interesting and funny things. As one elderly interviewee said:" Recalling the past makes me feel go back to the past." "Telling happy things itself is a happy thing, which also brings happiness to others." The second was their achievements and those they were proud of. Part of the reason was they could not do some things they could before:" I felt happy when recalling happy things, the memories brought me back."

Interaction of the prototype: They showed great interests in it, especially its intuitive operation. The metaphor of the slots-machine was understood and accepted by them. According to the elderly, sharing stories and handle operation were the most interesting functions. "The slots-machine-like operation raises me a sense of expecting and curiosity for the unknown." Most elderly interviewees felt the directly telling stories behavior was convenient compared with writing stories. Especially some of them had difficulty in writing: "Without good eyesight, you cannot do much alone, even if you are mentally totally fit."

Comments for improvements: Personalization: Questions were fixed in the prototype, and how to set personalized questions needs to be considered. Sustainability: There were only 35 questions in the porotype, how to sustain the story sharing process in a long-term way after all the questions are answered need to be considered in the future iteration. Usability: Some participants suggested that the sensitivity of operation should be reduced as their hands were clumsy. One participant thought the prototype could be friendlier by displaying "Thanks for your story" after stories are told.

Findings of Interview with the elderly's children

Learned new things they didn't know before, and knew more about parents/grandparents: Most of the young participants said they learned completely new things from the recordings, and also they were surprised that there were lots of things they didn't know about their parents after listening to the stories. *"I never know my mother's infant name, and she told the origin of her infant name." "I didn't know too much about my great grandfather because he had passed away before I was born. I heard a lot about him through my mother's recordings." "I think the trigger questions have been thought of for me, in case I didn't ask the elderly."*

The recordings were a treasure to pass on to next generation: Some young participants thought the recordings could be kept and passed down for generations, as the recordings were like biography

encapsulating the life of the storyteller. *"Our parents and grandparents are guardians of a very personal memory treasure, which need to be preserved. I think that is the meaning of the prototype."* Another young participant said*:" I think I can play the recording to the next generation and talk about how it was with her grandmother back then, great idea for recording memories to be handed down the generations."* Recordings would also be a consolation if the elderly passed away: *"If mom once died, these recordings with many heartfelt memories can certainly give a little consolation."*

A good way to ask some embarrassing questions: Some young participants felt listening the recordings was different from listening to the elderly talking face to face, as the former was a good way to know some embarrassing questions they wanted to know. The prototype provided a way of avoiding awkward situations.

Enabled the young to be aware of the importance of preservation of life stories of their parents: Some of the young participants agreed it enabled them to be aware of the importance of life stories of their parents. The first reason was that they learned new things that they didn't know before. The second reason was, there were some that the elderly couldn't remember, so the sooner they tell their stories, the more they could remember:" When we were young, we might be not interested in stories of parents, but later when we would like to ask them, they might already pass away, and we couldn't ask anything longer. I will keep all these memories well and will learn much more."

Voice contained real familiarity and emotions: Most participants felt familiarity with the voice. The voice contained emotions, personalities, and feelings. One young interviewee said: "I even hear the meow of her cat. I could imagine the scenes of she telling her stories." Compared with text, voice contains real familiarity and emotions. "I could even hear her laughter when recalling happy memories. the happy stories made me happy too, and that was also nice to remember."

Developed conversations when using face-to-face: Trigger questions that Slots-story provided were of different themes. It acted as a conversation topic generator when they used face-to-face.:" It helps to develop conversations that we would never have had before." "It can serve as a conduit for discussion, and one gets to know each other differently."

Thematic analysis of stories

Stories told by the elderly were conducted the thematic analysis. Thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within data. It minimally organizes and describes the data set in (rich) detail (Braun & Clarke, 2006). The thematic analysis emphasizes on the content, as grounded theorists do, investigators collect many stories and inductively create conceptual groupings from the data. Data in the form of personal experience offers the opportunity to uncover topics and themes to study participants would have remained unknown and consequently unanalysed by the researcher using a fixed interview to gather data.

Method

Transcription of the stories: There is considerable variation in definitions of life story, which leads to different methods of analysis, but all the methods require constructing texts for further analysis, which is the transcriptions (Riessman, 1993). In our case, transcription conventions and guidelines were based on Robert L. Miller's method (Miller, 1999). We didn't choose what to preserve and what to discard, and all the audios were retained and transcribed.

Thematic analysis: Following (Sanderson & McKeough, 2005), the themes of the stories were defined, and were labelled according to categories.

Table 2: A snippet of transcription

Transcription	Theme	Label
The first question is 'were you ever told anything unusual about your birth'. When I see this question um.....Naturally, I am reminded of when I was little, my mother told me: "My girl, you will be a lucky girl. "I said: "I certainly hope so, but why do you say so?" And she said: "It is because you were born in autumn, and we had a harvest that year. At that time, thousands of people died of famine. We didn't know where our next meal came. But when you were born, we had an autumn harvest. So, I believe you will be a lucky girl."	Her mother believed she was a lucky girl as when she was born in autumn harvest	Birth

Results: proportion of the life story themes

Themes of the stories could be roughly divided into descriptions and perceptions. The former mainly includes descriptions of the event, object, or people. The latter mainly includes feelings, self-evaluations, and life insights.

All the themes were generalized into 14 main categories and 38 sub-categories. Proportions of story themes the elderly told are calculated, as it could reflect the preference of talking topics, from an objective perspective.

Themes they talked most were about **Childhood**, among which "funny things" and "historical events" were they talked the most, which was in line with the result of the interview: they would like to talk about happy, positive, and funny things, especially childhood. The next main category was related to **Family**, among which the most is about "family members". Followed by "parent's teachings", which are beliefs and ideal parents taught them. 13.7% of themes were about **Perception**, in descending order it includes "feelings", "insights", "self-evaluation", "world-view", "belief", and "regret". Next is **School** (10.5%), among which "proud things" are they talk the most, which is in line with the interview: they would like to tell stories they were proud of. The category of **Impressive things** includes is complex, mainly about memorable stories: for example, important life decision, mysterious thing, dangerous things, etc.

One thing to note is the "skill instructions" are interspersed in their narratives. For example, making hand-made shoes, chess skills, skills of writing articles. These are also intangible treasure worth preserving. Additionally, in the theme of "**Memento**", photographs, mementos are important visual clues to help the elderly recall. These kinds of memory cues also need to be explored in the next iteration.

Stories told by the elderly weren't limited to the trigger questions provided

Results also showed that stories told by the participates were not limited to the 35 trigger questions, and the older participants didn't slavishly follow the topics of the trigger questions and dutifully record corresponding stories. Three aspects could account for this: Firstly, the narrative was not always linear. The trigger questions acted as jumping-off points which sparked broader memories, and gradually the narrative becomes non-directive and unfocused. One story might remind the elderly of the other related story. Secondly, some participants got used to using it to tell stories gradually, when a story suddenly came to his mind, he would like to use the prototype to record. Thirdly, the process of recalling gave the storyteller an opportunity to review his/her life. After a life review process, the elderly acquired a new sense of personal authorship and life reflections in their life journey, more and new insights on lives emerged.

Discussion

Designing for older adults' storytelling

Memory trigger is essential to storytelling, trigger questions should be open-ended, concrete, and in everyday language: During our interview, we found one of the problems for older adults' storytelling was the apparent lack of topics. Therefore, memory trigger is necessary: A memory trigger is a circumstance or piece of information which aids the memory in retrieving details not recalled spontaneously (Dictionary, 2008). Secondly, unlike the close-ended question, the open-ended question needs to be answered with more thought and more than a simple one-word answer. Tigger questions should be open-ended. Secondly, according to the interview, most of them pointed out that trigger questions provided in Slots-Story were easy to answer as they

were concrete and in everyday language. Concrete trigger question is easy to answer as it facilitates reminiscence and prompts a specific story.

Tangible interface employing metaphor makes technology accessible for the elderly, acts as a physical reminder to encourage the elderly to tell stories: According to our interview study, most elderly interviewees still relied heavily on paper and preferred physical interaction and operation. As such, tangible interface could be adopted to provide physical feedback and overcome the limitations of screen-based interfaces. Literature has reported tangible interfaces are more accessible and suitable for the needs of the elderly, and interactions that remind them of familiar devices have a higher acceptance (Rodríguez, Karyda, Lucero, & Herskovic, 2018). Metaphor in the interface could reduce barriers of the elderly to use as well as reduce learning time (Irizarry, Downing, & West, 2002). In our case, the metaphor of slots-machine was understood and accepted by the participants. They showed great interests in its intuitive operation. From the perspective of design, Slots-story device is an interactive device with a tangible interface. The classic aesthetic of the Slots-story makes it unobtrusive when putting it at home, which would encourage and attract the elderly user to use it. Slots-story not only makes the digital content accessible and visible, and it also serves as a tangible reminder for the elderly of what it holds. Research has revealed that tangible materials produce deeper engagement, evoke deep emotional responses. Tangible reminders could be powerful tools in encouraging positive behaviors and thought patterns (Brown, 2009).

Using audios as the storage medium could lower the cost of narrative for the elderly, which could also retain information to the maximum degree. Given that the elderly felt difficulty in writing gradually, using audios as storage medium could lower the cost of narrative for them, compared with handwriting. Moreover, stories in audio forms could retain information to the maximum degree compared with stories in text form: the audios involve real emotions, feelings, ambient sounds, etc.)In our context, audio also shows advantages over video: A study points out that video is too real to allow room for thinking about the past with others (Chalfen, 1987).

Slots-story contributed to personal content acquisition and preservation: Autobiography is defined as the history of a life story, written by the person who has lived and experienced that life (Birren & Cochran, 2001). The importance of audio recorder has been emphasized by Millet: without it to preserve the very sound of language, we should have no idea of how people really talk: their pauses, inflections, emphases, unfinished sentences, short periods (Millett, 1975). In this sense, story audios collected by Slots-story are an audio version of an autobiography. Slots-story contributes to personal content acquisition and preservation, and helps the young generation to acquire and preserve stories of their parents/grandparents, and the stories could even be kept and passed down for generations.

Designing for intergenerational communication

There exist differences between using Slots-story face-to-face and separately. In our case, Slots-Story could be used face-to-face or separately by the elderly and the young. The reason was as follows: Despite that sitting together to communicate face-to-face is the most common and enjoyable way to share stories (Lindley & Monk, 2008), most older adults lived apart from their children, and duration of each visiting was limited. The older adults and their children's lives were also usually unsynchronized. Hence, the prototype should be able to be used both face-to-face and separately. When the elderly and the young use the prototype face-to-face, trigger questions that Slots-story provide are of different themes, and it acts as a conversation topic generator. While when the elderly use the prototype by themselves, they could be fully concentrated to tell the past things with deeper insights, and needn't care about the other's attitude or expressions. In this case, the stories they told are complete and integrated. Also, using the prototype separately is a good way to ask some embarrassing questions.

The story sharing process is not solitary but a collaboration process, as in addition to the storyteller, the responsive receiver is also needed. Process of storytelling could be formulated (Figure 4): triggered by the memory cues, the elderly tell stories and which are then conveyed to the young, the young provide feedback to the elderly, feedback from the young could effectively encourage the storytellers to tell more, also the feedback may also act as new memory cue. The story sharing circulation could be sustainable when all the above factors are integrated.

Facilitate life story share in a sustainable way: In the design of Slots-story, the memory trigger questions are fixed, and the whole story sharing system is not sustainable. We could close the loop of story sharing process by actively involving the young generation. In the current iteration, the young are passive participants. Efforts

should be made in the aspects of the young to turn them into active participants through personalization of trigger questions: Trigger questions could be raised and edited by the young.

Conclusion and future work

In this paper, we have a better understanding of the elderly's life stories. To be specific, we understand older adults' preference for story topics through thematic analysis. Insights on RQ1 are discussed in the section of thematic analysis. The field study indicated that Slots-story facilitated the storytelling and preservation for the elderly. We further conclude the implications of designing for facilitating elderly's life storytelling through their reflection during using our prototype. Insights on *RQ2* could be concluded as Memory trigger is essential to storytelling, trigger questions should be open-ended, concrete, and in everyday language. Using audios as a storage medium could lower the cost of narrative for the elderly, which could also retain information to the maximum degree. Tangible interface employing metaphor makes technology accessible for the elderly, acts as a physical reminder to encourage the elderly to tell stories. Separating the process of storytelling and story listening could make the stories complete and integrated. Personalization of trigger questions, and trigger questions could be raised and edited by the young. The loop of story sharing process should be closed to make the sharing process sustainable.

As some of the stories told by the elderly were related to their mementos, such as album, souvenir, artwork, etc. Photographs, mementos are also ideal memory trigger as they provide visual clues, which help the elderly recall events, even long-forgotten stories. This inspired us to explore their mementos and related stories in the next iteration.

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Co-refining Interactive Systems with Older Adults from Function, Form and Interaction

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Designing interactive systems that are pragmatic, attractive and easy to use for older adults is challenging. Participatory design, as an approach to enhance the mutual understanding between designers and end users, has been proved to be useful to improve the quality of design for older people. However, PD research has long been criticized for extensively dealing with the early-phase design while putting less emphasis on the later stages. In this paper, we argue for the importance of collaborative refinement when designing interactive systems for older adults. Through a case study, we describe our experience of co-refining the preliminary design of an interactive system with older participants from three perspectives: function, form and interaction. We also explored to adopt some potential PD methods and conclude by discussing the effectiveness of the chosen approach and methods.

Keywords: participatory design, older adults, interactive systems, refine

Introduction

Global population aging and the rapid development of novel technology lead to an increasing demand for interactive systems to enhance older adults' quality of life by promoting their independence and social wellbeing. However, designing interactive systems that are pragmatic, attractive and easy to use for older people could be challenging due to the lack of mutual understanding. In the past decades, we have witnessed a new design movement shifting from designing for users to designing with users (Sanoff & Henry, 1990). Participatory design (PD) was initially proposed as a set of approaches to involve workers in the development of technology to increase worker autonomy, skill and task variety (Tollmar & Konrad, 2001). Since many PD approaches put low requirements on users' ability and beforehand knowledge, they have been extended and increasingly adopted in designing with marginalized groups such as older people. Although it is hard to find a fixed methodological description, most PD methods are often characterized as a multi-phase process that includes three key stages (Kaulio & Matti, 1998; Vink et al., 2008): the early phases (exploration, idea generation, etc.), the middle phases (concept refinement, detailed design, etc.) and the later phases (user trial, assessment, finalization, etc.). Theoretically, the end-users are expected to be involved throughout the whole process. However, many PD studies and practices have long been criticized for extensively dealing with the early phases while putting less emphasis on the later stages, especially the refining process (Tollmar & Konrad, 2001). Most research only slightly mentioned the refinement from a holistic perspective. It is reasonable because general participants can actively engage in the early-phase PD activities and contribute their ideas clearly, so the refinement is usually treated as an effortless transition from ideation to evaluation. However, we believe the refining process would be much more important when designing interactive systems with older adults. First of all, the early-phase PD techniques that are available for older people are limited. Haigh (1993)

described the design challenges caused by the aging process of vision, hearing, hand function and mental aspects. Many PD techniques that used to be effective to generate concepts could be difficult for many older people such as sketching, drama and paper modelling. Secondly, many interactive systems to be designed are unfamiliar to older users, so the design subjects in the early phases are usually difficult for them to understand or propose clear ideas. Therefore, the contributions of the early phases would be much less than collaborating with younger participants. In most cases, designers need to collect older participants' related demands and interpret them into system specifications. It is not a smooth process because these proposals are usually ambiguous or even in conflict with each other. Designers need to screen them and make assumptions to develop preliminary concepts. However, the process of interpretation and screening is mainly based on designers' own cognitive and physical ability (Wilkinson, Christopher, & Antonella, 2014), which might lead to a deviation from older users' real needs. Therefore, the refining process is very important to maintain the consistency between designers and older users in the PD process of interactive systems. Moreover, it would be much easier and efficient for older participants to criticize existing proposals than imagining a future design. However, few PD studies focused on how to effectively refine the early-phase design with older people. Related knowledge about the methods and techniques are also limited. Through a case study, this paper describes the refining process of an interactive system designed for nursing home residents to support their independence and social interaction. We explored to adopt a model proposed by Frens, et al. (2003) as a general principle to collect and analyse the data from the perspectives of function, form and interaction. We also explored to use some potential PD techniques to involve older users in the refinement. The findings of this study can demonstrate the effectiveness of the selected PD approach and techniques. They also provide new insights into some key features of interactive systems that are valued by older users.

Related work

There have been many studies in the area of participatory design involving older people, most of which were described as case studies. Šabanović et al. (2015) presented a project to develop socially assistive robots with the elderly diagnosed with depression. They found that older adults were willing and have the ability to engage in PD process, but conventional hands-on participation might be a challenge. Wilkinson et al. (2014) explored how to apply PD approaches in the process of commercial product development through designing an intelligent mobility aid and wheelchair. They addressed the importance of including elderly users during the early discussions to facilitate new concept generation. Veldhoven et al. (2008) focused on designing acceptable assisted living services for the elderly and presented a design vision by illustrating three cases. They summarized three main barriers for elderly users to use new technology as complexity and learnability, lack of perceived benefit, compatibility issues. Seale et al. (2008) explored the use of the focus-group method to help older adults identify their mobility-related problems and put forward new ideas. They found that the participants were able to propose existing and new solutions, but the composition and process of the methodology should be further developed by validating the choice of tools. Kanis et al. (2011) conducted a preliminary study to design ambient assisted living systems for monitoring the daily activities of elderly residents, which proved that traditional use-centred design methods could hardly help older adults to visualize ambient assisted living scenarios. Regarding specific techniques, organizing group design activities such as future workshops and brainstorms were common solutions. Besides, video demonstration was frequently used to quickly provide a concrete vision for older people via showing existing solutions and illustrating future scenarios (Šabanović et al., 2015; Iacono et al., 2014). It can also provoke creative responses and critical discussions (Raijmakers et al., 2006; Lindsay et al., 2012). Some studies also found that hands-on techniques, though some of which were challenging for older adults, were more successful than verbal explanations or demonstrations. Conventional hands-on techniques include sketching, card sorting, collage, paper prototyping, etc. Some studies also explored novel techniques by providing live demos and creating interactive simulated scenarios to actively engage the participants (Kanis et al., 2011). These studies, as mentioned above, mainly focused on elaborating the early phase to generate initial insights and concepts.

As mentioned above, limited studies mentioned how to involve older people in the refinement of preliminary design. Even fewer described it in detail. Prototyping was reported as one of the most common techniques in this phase, especially sketching and paper prototyping (Vanden et al., 2006; Muller & Michael, 1992; Massimi et al., 2007). Demirbilek and Demirkan (2004) conducted a series of research to involve elderly end users in housing design and proposed the USAP (Usability, Safety, Attractiveness Participatory) design model with 5 phases. The second phase is defined as concept refinement in which elderly users are invited to criticize, correct and modify the sketches of the early-phase design. But there were also studies reported that the

seniors had trouble to draw or engage in paper prototyping activities (Vanden et al., 2006). Besides, digital mock-ups were often used to refine interactive products and systems. Ellis, et al. (2000) described their refining work with older users to increase the usability of an existing website. They used the cooperative prototyping method to engage the participant in a circle of page viewing, discussion and comments, reformatting, and further viewing by using a HTML editor and browser. Massimi (2006) and Botero (2013) translated paper designs of an interactive memory aid into digital ones with PowerPoint for the adjustment of elderly users. Different from the early phase, the adjustments were conducted in individual sessions for in-depth feedbacks. Hands-on activities were also proved to be effective to refine the interactive systems for older people. Stappers et al. (2009) presented preliminary ideas to the participants in the form of storyboards, play-acting, and low-profile prototypes to encourage spontaneous suggestions.

By looking at the prior work, we found that some PD methods that are effective to generate preliminary concepts also have potential to be applied in the refining process. However, given the different emphases between the two stages, there is still a need to further explore and develop proper techniques and methods to co-refine interactive systems with older people.

The preliminary design

This paper aims to explore how to collaborate with older users in the refinement of interactive systems through a case study. The preliminary design was from an ongoing project aiming to involve older users in the design process of an interactive system in public spaces of nursing homes. The purpose of the system was to support residents' self-entertainment and promote their social interaction by digitally augmenting residents' newspaper-reading experience. In the early phase, we collaborated with eight residents and developed a preliminary design and a prototype. As shown in Figure 1, the system comprises multiple units installed on different tables in the public space of nursing homes. Each unit consists of newspapers with special marks (coloured circles), a tangible tool and a nearby digital display. The marks indicate the interactive areas on the newspapers. These areas are specially enhanced by modern technologies for printed matter recognition. By placing the tangible tool on the marks, residents could get access to corresponding digital content from the screen. The digital contents are real-time images or videos searched from related websites. The digital interface is very simple. It directly displays digital videos or images with brief descriptions in digital texts. When no one uses the system, the screens would display nothing to avoid disturbing. As shown in the storyboard, the envisioned system was designed not only to support individual entertainment ('After 01' in Figure 1) but also to encourage communication and enhance mutual understanding ('After 02' in Figure 1). Although most features were designed based on participants' reflections in the early phase, the preliminary system was constructed with many assumptions and indefinite features that need to be confirmed or challenged in the refining phase.
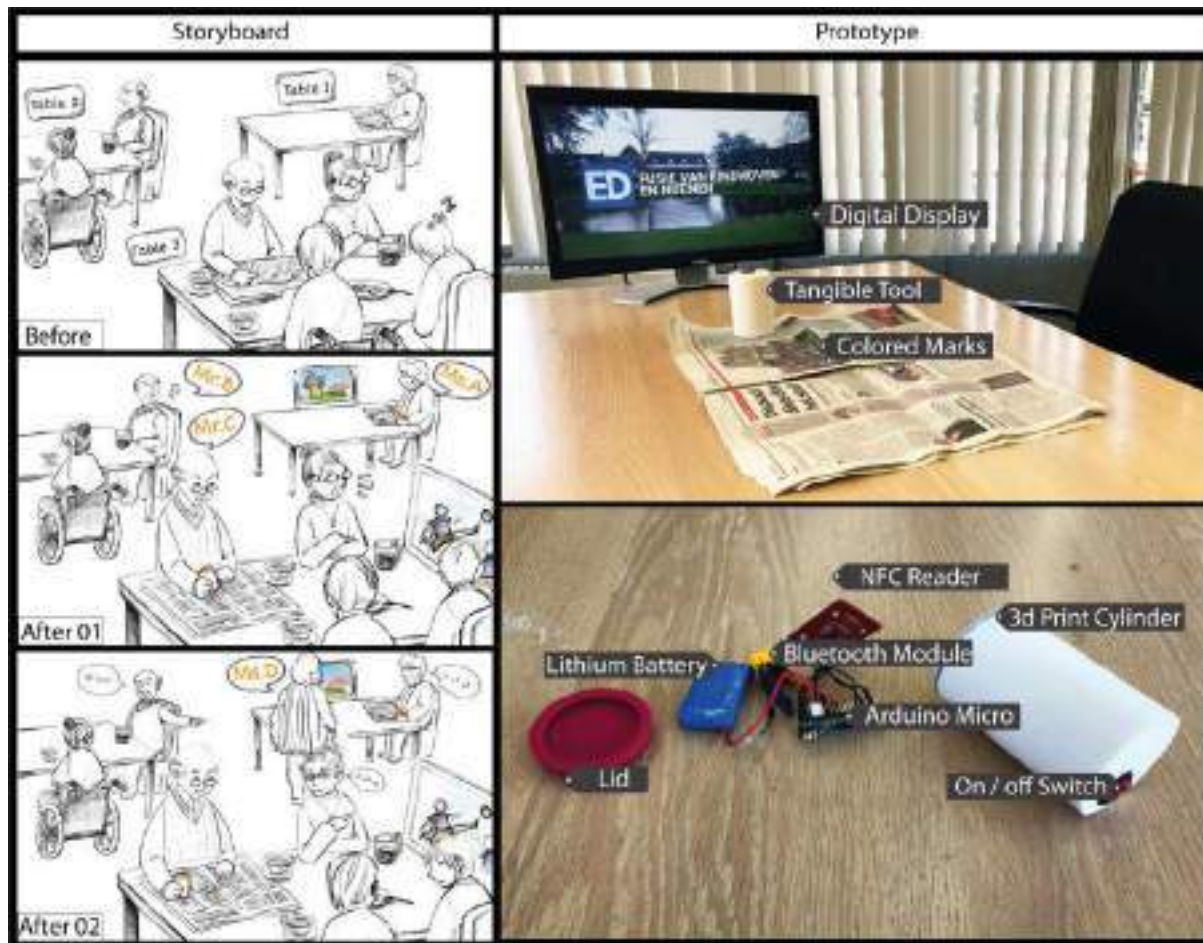
Figure 1: The preliminary design is presented as a functional prototype and a storyboard (the first scenario depicts the current situation in care homes. The last two scenarios illustrate the situations after the system is applied.)

Method

We used the combination of potential PD techniques and social research methods suggested by Pilemalm (2007). The PD techniques include critical discussions on video demonstrations, storytelling, hands-on experience, collaborative prototyping and sketching. The social research methods include semi-structured interviews and observations. Given the difficulties for many older participants to understand and propose suggestions on system specifications from technological perspectives, we used the model proposed by Frens, et al. (2003) as a general principle to guide the design of interview questions, data collection and analysis. This model defines the interactive products through its form, interaction and function, and has also been used to design interactive systems that are pragmatic, attractive and easy to use (Frens et al., 2009; Hengeveld, 2011). For a better understanding, we converted this model into three questions from older users' perspective: "*What should the system be able to do?*" "*What should the system be like?*" and "*How would I use the system?*" According to the model, these questions could not only correspond to different system specifications, but also inherently relate to each other. The data collected included audio-recordings of the interviews, the sketches and the photos taken during each session. The data were transcribed and analysed using thematic analysis techniques, and the findings can guide the refinement of the preliminary design from the three dimensions of the model.

Settings & Participants

This study was conducted in the canteen of a nursing home in Eindhoven. It belongs to a national caring organization that has set up 22 similar nursing homes distributed in this city. The canteen is the main public area where most residents would like to stay when they go out of their private rooms. We firstly acquired permission from the managers, and then the residents were randomly invited individually in the canteen.

Given many participants' reading or writing difficulties, consent was given orally before each session. Five residents agreed to participate. Table 1 gives an overview of their basic information. Reading Frequency refers to their frequency of reading newspapers in public spaces in the nursing home. All of them had the basic hand function to eat independently, but only P5 could walk independently.

Table 1: the basic information of the participants (reading frequency: frequency of reading newspapers in public spaces. Sometimes: 3-4 times a week; rarely: 1-2 times a week.)

Participant	Gender	Age	Length of Residence	News Source	Reading Frequency
P1	F	82	9 years	TV, newspapers	Always
P2	F	92	11 years	TV	Never
P3	M	65	1.5 years	TV, newspapers	Always
P4	F	70	2 years	TV, newspapers, smart phones	Rarely
P5	M	84	5 years	TV, newspaper	Sometimes

Procedure

Figure 2: the materials used in this case study

1.Introduction (5 minutes)

We started each session with a brief verbal introduction to inform the participants that we hope they could help us to further develop and refine our preliminary design of an interactive system that could present related digital information when they were reading newspapers in public spaces. They were encouraged to express any comments, suggestions and questions at any time.

2. Demonstrations of related existing solutions (10 minutes)

After the short introduction, we showed the participants six videos of some existing technologies or systems to augment paper interfaces and ask their opinions during each demonstration. The purpose was to enhance their understanding of such systems and give the participants a wider vision of current solutions to avoid restricting their minds within our own design. The six videos presented three kinds of solutions that were

already available on the market but designed for other contexts. Table 2 gives an overview of the solutions from the three aspects mentioned above. After showing all the videos, the participants were asked to compare them, choose the solution they like or dislike, and then describe the reasons. During this, we presented six cards that represent each video to help them recall.

3. Demonstration and experience of the preliminary design (15 minutes)

In this stage, we presented the preliminary design by showing the participants a 1-minute animation converted from the sketched storyboard (Figure 1). The video demonstrated the different scenarios before and after the design applied. We explained the details and asked their opinions simultaneously. After this, we offered the participants the functional prototype to experience for 10 minutes and provide further feedback. We prepared four pieces of digital content related to the printed content from a local newspaper according to the residents' preferences reflected from the early phase. They were a piece of entertainment news, a current event that took place in their neighborhood, real-time weather information and an image of crossword puzzles.

4. Collaborative refinement (30 minutes)

In the final step, the participants were asked: "*if you could change anything about the design, what and how would you like to change?*" Then, they were encouraged to describe their ideas from function, form and interaction. The designers would help to quickly embody their proposals by sketching. In addition, we prepared three boxes of design references to facilitate their refinement on physical interfaces (Figure 2). The first box contains some daily objects that are often used on paper including a stapler, a magnifier, a stamp, a glue tape roller, a marker and a glue stick. The second box contains some physical electronic interfaces such as a mouse, a remote controller, a small gamepad with a joystick, a pen-like scanner and a gun-like scanner. In the third box, we prepared some electronic components such as some buttons, dials, joysticks in different forms and sizes that can be added to other devices. The participants could select their preferred forms, describe functions they liked to add and show the designer how they would use them. Regarding digital interface and interaction of the system, we used a media player and a live-programming environment (VVVV in this case) that is characterized by real-time rendering and simulation to quickly visualize the participants' proposals on the screen. In this step, the participants and the designers interactively engaged in a cycle of discussion, revising and previewing.

Table 2: the demonstrated existing solutions

Solution	Form	Function	Interaction	
			With physical interface	*With digital interface*
Interactive tabletop with projection		Recognize pages by codes, track paper position, project interactive animations on the page and table	Flip the pages, move the papers	Touch and drag projected elements
Interactive tabletop with multi-touch table		Recognize cards by code, track card position, display interactive information around cards on the screen	Put the cards on the screen, move the cards	Touch and drag digital elements on the screen
Augmented Reality book with PC and camera		Recognize pages by the camera above, track paper position, display digital effects above the page on the screen	Put the book under the camera, flip pages, move the book	None
Augmented Reality book with tablet		Recognize printed images with the embedded camera, track image position, display interactive animations above the image on the screen	Hold the device, point it at the page, flip papers, move the book	Touch and drag digital elements on the screen

| Pen-like handheld scanner | | Recognize printed texts, display interactive information on the screen | Hold the scanner, slide it on the paper, press the button | Touch digital buttons on the screen |
| Gun-like handheld scanner | | Recognize printed codes, display interactive information on the screen | Hold the scanner, point it at the code, press the button | Select functions with the mouse, input information with the keyboard |

Findings

What should the system be able to do?

In Step 2, the participants' function-related feedbacks were very limited. The videos of the existing solutions were more likely to trigger their comments about form and interaction because it was much more direct and vivid to understand. Even though we kept explaining during each demonstration, it still seemed to be difficult for the participants to understand what these applications could actually do because they were designed for the younger generations and other contexts. "*I am too old for this. I can't learn this*." P2 said. Their reflections were mainly about different ways to recognize printed content. When watching the videos of the augmented reality books, P5 said people living here were not familiar with computers and smart phones, but it might have future because the dynamic digital contents would attract more people and could save the time of reading. He also said: "*However, people here would not like the cameras pointed at their tables. They would feel their privacy (has) been violated*." P4 liked the solution of handheld scanners and said it reminded her of the barcode scanner from the supermarkets. "*People here can use this to select the articles they like and project them on the screen*."

In Step 3, the participants could propose more ideas on content selection especially after they experienced the prototype. Local news was their common interest, which was consistent with the insights from the early phase. They also had some personal interests that could represent the preferences of similar groups. P1 liked puzzles and she thought the system was helpful for her to solve puzzles together with her friends. P2 addressed the importance of real-time content because many people here liked to read and talk about sports news. P3 thought the design was suitable to be used in small groups, and people could choose their preferred subjects. P4 preferred entertainment news because sometimes there were live performances in this canteen. Many People liked it, but they need to pay for them. P4 also suggested that the system could be used not only on newspapers, but also on magazines, photos, flyers of advertisements and even postcards. "*I have a sister living abroad. She sometimes sent me postcards. Maybe I can see her with this!*" P4 said. P5 said the preliminary design was much easier for him to understand than the videos of other solutions. "*Of course, it relates to personal preferences. Some people like reading newspapers. Some people don't*." He said, "*But I think such thing is important to provide different things for people here to spend their time. Their life is too structured. No future, no challenges. They don't know how to spend their days and the next days.*"

In Step 4, the collaborative explorations could trigger the participants to explore what else the system could do besides the very basic functions of the preliminary design. They tended to compare it with the devices that they were familiar with such as televisions and radios. The result showed that all of them wanted to control the volume of digital content. P1 said the canteen was too noisy to hear the videos sometimes. "*I cannot hear it unless I sit close to the screen*." She said. P2 emphasized the importance of sound due to her poor sight. She said it was also very important when using the design in groups. "*The volume needs to be loud if the group is watching it, but it may disturb others if it is too loud*." P4 also expressed her need to adjust the sound personally. She suggested the system could connect to some personal hearing devices so that everyone could set their own volume. P3 and P5 hoped they could control the volume with very low efforts. "*I lost one leg last year. I don't want to walk to the screen and bent over to control the sound if I can do it sitting here*." P3 said. The participants also proposed other potential functions to meet their various needs. P1 and P4 were inspired by the remote control and thought it would be nice if they could pause the video. P1 thought the pause function would trigger people to discuss. P4 though the pause could let her take a break if there was too much

digital information. Besides, P1 also wanted to switch the images displayed because she was curious about all the details. P4 asked if she could zoom in and zoom out the images. P5 suggested that partly rewind would be useful because people would easily miss the interesting part due to their sensory impairments and unstable environmental conditions. However, although we encouraged them to propose as many ideas as they could, all the participants repeatedly reminded us not to add too many functions. "*You must keep it simple. Just basic functions or people here will not use it.*" P2 said.

What should the system be like?

In Step 2, the participants' form-related comments were very general and similar to what P4 said: "*It is beautiful! I like it.*" But when we asked how they would feel if we applied these solutions in this area, their attitudes changed. All of them held the view that the videos looked very nice, but people here do not like things look technical here. "*They look too futuristic. People may get curious, but most of them always keep a distance from the innovations.*" P5 said. Most of their critical comments focused on physical interfaces. All of them thought the devices in the videos were too complicated, including P4 who could use smart phones. P1 thought the interactive tabletops could be useful when the caregivers host activities, which could develop their brains, but it would not be suitable to use independently. P1 and P4 reflected that the screens of smart phones were too small to watch. Tablets were much better, but they were too heavy to hold. Comparing with interactive tabletops and augmented reality books, the handheld scanners were easier for them to understand because they had seen them before. However, they did not like the technical appearance. Besides, they were not friendly to older adults. P3 and P5 said that it was difficult for many people here to keep holding devices. Besides, P5 said he did not like the barcodes on the paper, which looks too abstract. "*I don't like it and don't trust it.*" He directly said. P2 said she could speak for most residents because she has lived here for a long time. She emphasized that people here fear unfamiliar things. They would not use or share it if it looked too technical.

In Step 3, the animated storyboard and our simultaneous explanations provided them a general understanding of the design. They all agreed that the canteen was the ideal location to install it because this was the most popular space in this nursing home. P1 suggested the information should be displayed on bigger screens than the laptop we used. P2, P3 and P4 liked the idea of distributed units because they used to share one big display in the whole space when there were some activities. But many people could not watch or hear it very clearly, and different people had different interests. These complaints also reflected in the early phase, which further confirmed our design decisions. P4 also suggested that these displays could be folded under the table when not being used. Most of their feedbacks still focused on physical interfaces. Although we asked them about digital interfaces, most of them only wanted to watch images or videos from the display. They hoped to keep digital information as simple as possible. When experiencing the prototype, all of the participants except P3 had difficulties to find the marks on the newspaper when they were holding the tangible tool. But they could quickly understand and use independently when we pointed them out. They suggested that the marks should be clearer and more obvious. P5 said: "*Maybe a different colour. Maybe a different shape.*" Regarding the tangible tool, most participants were basically satisfied with its current form, especially its size and weight. Some participants also propose their opinions for improvement. P1 said the tool looked too much like a coffee cup, which would easily lead to residents' confusion. Besides, the size should not be too small, otherwise people would not notice it or feel difficult to find it. P2 hoped it could be more attractive because the current form was too ordinary.

In Step 4, we encouraged the participants to propose specific solutions to refine the current physical and digital form based on their requirements in previous steps. However, it seemed they had little enthusiasm on the digital aspects. All their feedbacks still focused on keeping them as simple as possible or use their familiar interface like televisions. P1 suggested there could be some simple instructions on the screen to guide people to use it. Regarding the physical aspects, it also seemed difficult and stressful for them to describe their own solutions than criticizing videos or the preliminary design. The reference objects turned out to be very helpful to facilitate the process of the collaborative refinement of the physical interface. After trying the objects, they selected their favourite form. As shown in Figure 3, P4 thought the tangible tool could be like a pen while the other four participants selected stamp as an ideal shape. P4 made the choice because she was attracted by the video in Step 2. She thought the shape was very comfortable and easy for her to use. Besides, if the system were installed on many tables, it would be convenient to carry it to other places. However, P2 and P5 hold a different view that there were usually normal pens on the tables, which would make people mix them up and feel confused. P2 also expressed her concerns about security:" *The pen was too small to be found on the table,*

and people will easily take it away." P3 remarked that many people could not properly use pens due to shaking hands. P1 was satisfied with the shape and size of the stamp. She thought it was important to freely move it around like playing chess. In addition, it was easy to draw residents' attention because they had never seen stamps on the tables before. P2 thought the shape of the stamp could motivate people to place the tool on papers. P3 and P5 also liked the shape because it was effortless to pick up and drop down than other objects. Furthermore, P1 and P5 thought the stamp looked much nicer because the most tools related to paper were for work or study. "*It is strange to use these because people here do not study or work anymore.*" P5 said. He also pointed out that no residents would prefer assistive tools like the magnifier that might make them feel stigmatized. None of the participants proposed material-related requirements unless we asked. Most of them preferred plastic tools than wooden ones because the plastic was easier to clean if it would be used by many people. P2 and P5 also thought using wood was too old-fashioned.

How would I use the system?

In Step 2, the participants' interaction-related comments were very similar to each other. All of them claimed that touching or dragging on digital screens was too complicated for them. P1 said:" *My granddaughter taught me many times, but I still cannot use it (tablet).*" The tangible scanners were much easier for them to accept and understand. The interaction with the pen-like scanner was more preferable because holding the gun-like scanner in the air was very difficult for many older people, not to mention they needed to point the scanner at a certain area on the paper.

In Step 3, all the participants could quickly understand the basic interaction of the system from the storyboard animation. After quick instruction, they all could use the prototype independently although some of them have difficulties to find the marks. They agreed that the interaction was friendly for older people because it was effortless and required much less accuracy than the scanners in Step 2. However, when asked to develop more interactions that could integrate the functions and forms that they proposed previously, none of them could propose solutions by themselves.

In Step 4, given the participants' difficulties to design interactions, we had to play a more leading role in this part by proposing more possibilities and visualizing their ideas by sketching. We found the participants relied on the objects in the boxes very much for inspiration and reference. As shown in Figure 3, adding big buttons were the most common solution for the functions like "on-off", "play-pause" and "switch images". Most of them preferred to put the buttons near the handles so that they could easily press them when holding the tool. But P5 thought it would cause many maloperations when picking up and moving the tool around, so he chose to put the button at the bottom. As for the linear functions such as controlling the volume and rewind, P1 and P3 were inspired by the mouse wheel and proposed to adjust the volume by scrolling a gear embedded in the handle. P5 also wanted to add a wheel at the side of the pedestal of the stamp to rewind the videos. P4 suggested adding a special button. People could press its two ends to turn up / down the volume. P2 was inspired by her experience of using old radios. She thought it would be nice to rotate the handle like a knob. Besides sketching, we also simulated the digital feedbacks with fast programming tools (VVVV in this case) and media players to create more concrete scenarios for the participants. P5 gave up adding the rewind function after he watched the simulated effects. "*It is too sensitive. The images are always changing. I guess people may not like this*." He said.
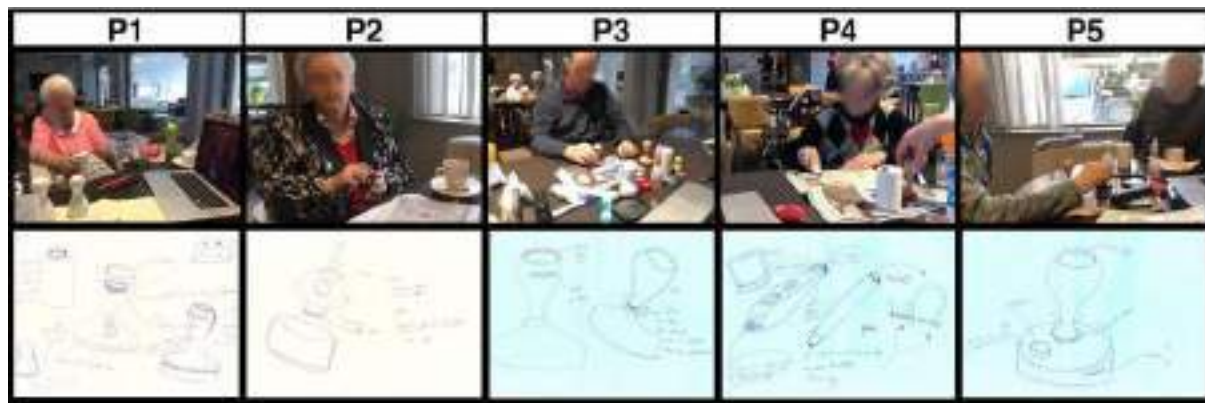
Figure 3: All the participants tend to refine the system through its physical features.

Discussion

Our findings demonstrated that the participants were willing and had the ability to collaborate with designers in the refinement of interactive systems. The three perspectives were not only easy to be accepted by older participants but also useful to be a general guidance for the designers.

Overall, this study showed the importance of the selection of the site. Robins (1999) proposed two approaches: "*Bring the designers to the workplace and bring the workers to the design room*." Although design room has the advantage of easier access to equipment and technical experts, we believe participatory activities with older people should take place where the system will be applied because the real-life settings can reduce their efforts of imagination and take the environmental factors into account. Furthermore, researchers indicated that older people were more vulnerable to their surroundings (Fowles, 2000; Carstensen et al., 1986), so it is important to create a free and comfortable atmosphere given their physical inconveniences. In addition, although this study could not prove individual activities were better than group activities, we agree with Neustaedter (2006) and Sanders' (2010) studies indicating that individual sessions are more appropriate to design completely new systems and work better in detailing stages. It mainly because the refinement requires older participants' in-depth involvement rather than collecting parallel ideas, which is hard to be ensured through group sessions. Our prior work also revealed the problem that older people with better health and stronger personalities would easily be dominant in conversations and influence other group members. If it has to involve multiple participants simultaneously, we suggest involving more designers and experts to support each participant. In addition, we found it is very important for the designers to keep paying attention to the participants' energy consumption. The duration of each step should be more flexible according to participants' different physical situations, which could also show the superiority of individual sessions.

This study also provides detailed implications of the methods for collaborative refinement with older people. Although the video demonstrations of existing solutions have been frequently used in the early-phase PD activities, we believe it would easily create preconceived impressions that might constrain older participants' creativity due to their limited understanding of novel technologies. This study demonstrated that showing existing solutions was more appropriate in collaborative refinement with older adults. We found that the videos were able to broaden participants' minds and provoke their critical discussions. The key was to make simultaneous explanations and ask open questions during the demonstrations because it was very difficult for them to remember the details even though we prepared cards to help them recall. Besides, we learned that it was important to control the length and number of videos. Designers should select the most representative solutions and keep each video short. We presented 6 videos in this case, which seemed to be beyond some participants' ability to process the new information. They appeared to be uncomfortable when watching the last few videos, which certainly affected their contributions in this step. From the data we collected, we found the videos were more likely to trigger participants' comments on the form and interaction than the function of the systems. The reasons could be that they were unfamiliar with the technologies or the contexts, and some functions could not be directly shown through videos even though we explained. The animated storyboard was very useful to help the participants quickly understand the usage scenarios of the preliminary design. However, such understanding still seemed to be very superficial. It might because the storyboard could not fully illustrate some functions and details. It might also because sketched animations are not as easy to

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understand as live-action videos. The hands-on experience of functional prototype proved to be very effective for the participants to fully understand the concept and facilitate them to refine the system. We could tell the obvious differences between the participants' facial, verbal and bodily reactions before and after they experienced the prototype. We also found that using functional prototypes was more likely to trigger participants' ideas on functions. It seemed that such prototypes could effectively reduce the participants' efforts of imagination and increase the fun of creativity. In Step 4, the participants' major efforts were spent on embodying their preferred functions in suitable form and interaction, which was very challenging even for younger people. Although there was no fixed procedure, we found that all participants started with refining physical interfaces because they thought it was the most important and familiar part. The design references turned out to be very useful, even though we had concerns about the side effects to constrain their ideas. To minimize the side effects, we suggested that the selected related design references should be representative and have diverse features. As for refining digital features, the participants showed little interest and confidence. Although sketching has long been a widely accepted technique in participatory design, we found it was not as effective as expected when refining the digital aspects of interactive systems for older people because it is abstract, static and non-interactive. The live-programming platform (VVVV) that we used to simulate some digital feedbacks and effects proved to be helpful for the participants to preview the result. Therefore, we identified the need to develop more related hardware-software toolkits for rapidly visualize concrete, dynamic and interactive design proposals for older adults.

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Through service design to improve the HRQOL (Health-Related Quality of Life) in the treatment and rehabilitation of elderly women with breast cancer in Shanghai

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Breast cancer is the most common cancer among women in the world. As China enters the aging society, elderly breast cancer presents the characteristics of high incidence, late detection and long treatment time. This is related to the imperfect services that elderly women receive in the treatment and rehabilitation. Eventually, the HRQOL (health-related quality of life) in their later years has declined. By using service design tools, the authors conducted field research and in-depth interviews in Shanghai hospitals and developed service strategy to improve the Health-Related Quality of Life (HRQOL) in the treatment and rehabilitation of elderly women with breast cancer. The paper presents three design contents: (1) smart healthcare service system; (2) improvement of service scenarios in the hospital; (3) a life-long service that links communities, families, and individuals to transform breast cancer into "chronic disease". In this paper, the authors also discuss the next step and prospects.

Keywords: aging society, breast cancer, service design, smart healthcare, health-related quality of life

Introduction

Breast cancer is the most common cancer among women in the world, with an incidence of 24.2% (Bray et al., 2018). In China, the incidence of breast cancer ranks first among female malignant neoplasms, and Shanghai has the highest incidence of breast cancer among all cities (Huang et al., 2012). Elderly women with breast cancer in the survival period, due to the decline of physical function brought by the loss of health, often accompanied by the decline of physiological, emotional, social functions (Hu & Huang, 2008). They need to bear huge pressure from family and society.

As China enters the aging society, elderly breast cancer presents the characteristics of high incidence and late detection and long treatment time. According to relevant predictions, the number of elderly people in China will reach 270 million in 2023 (Qiu, Tian, Zheng, Cheng & Qin, 2015). Studies have shown that women aged 60 to 79 are 13 times more likely to have breast cancer than women under 39 (Wu, 2013). With the increase in the elderly population, there will be more and more elderly breast cancer patients.

Developed countries, such as the United States and the United Kingdom have developed smart medical care, involving electronic medical records, doctor-patient communication, personalization, and continuous medical care (Qiu et al., 2015). Shanghai, as a representative city of medical treatment in China, has formulated a

blueprint for smart medical care covering medical security, public health, medical services and drug security (Gong, Sun, Lin & Gu, 2013).

The specificity of pathology of elderly women with breast cancer in Shanghai

In Shanghai, the elderly breast cancer presents the characteristics of high incidence, late detection, long treatment time and low survival rate.

Firstly, the elderly breast cancer presents the characteristics of high incidence and late detection. Elderly women have poor alertness to their own physical conditions, and do not have a strong sense of health examination (Wei, Qin, Yu, Tang & Pan, 2007). Many elderly people do not go to the doctor until they have serious physical symptoms, which leads to the late detection of elderly breast cancer patients. By analysing 99 elderly patients with breast cancer, Cai found that the average disease duration of elderly breast cancer patients before treatment was 2 years, and the clinical stage was mostly staged II and III (77.9%) (Cai, Shao, Gao & Hu, 2000).

Secondly, elderly women with breast cancer have longer treatment time than young patients. Many elderly women discover breast cancer in the late period which leads to their long treatment time. According to the statistics, 45% of elderly patients with breast cancer have a course of more than 6 months (Wei et al., 2007).

Furthermore, the rehabilitation of breast cancer in elderly women is difficult. Elderly breast cancer patients often coexist with chronic diseases such as cardiovascular disease, diabetes, chronic lung disease, hypertension, and cerebral infarction. The data of Qiu showed that the overall 10-year survival rate of elderly patients is 40.8%, lower than 50.8% of young patients (Qiu, Wu & Guo, 2019). Therefore, it is necessary to take into account the treatment of these comorbidities in the treatment of breast cancer, otherwise, it will affect the quality of life of patients.

Elderly women who live in first-tier cities, such as Shanghai, tend to have strong negative psychology and uncertainty about the disease at the psychological level. A psychological study of 58 elderly cancer patients found that the depression rate of elderly patients was 32.76%, much higher than that of young patients (Diao, Niu & Li, 2002). This is because the social role of the elderly has undergone a huge transformation, from the "caregiver" to "people who need to be cared for", which leads to a stronger sense of loneliness and dependence. Especially after suffering from cancer, elderly patients hope to get more intimate and lasting interpersonal relationships (Li, Shi, Shen & Shen, 2015). By analysing the data of 348 elderly women with breast cancer in the literature of the paper, the research team found that the scores were low in physiological status, social and family status, emotional status and additional attention (Li, Sun & Yan, 2015; Fang et al., 2010).

Service design for treatment and rehabilitation of breast cancer

Service design has been introduced into the medical and health fields in recent years. Mayo Clinic has achieved great success with the use of HealthKit service to share health data among patients, healthcare workers and medical institutions. Design schools and companies already have done some service research and service design on improving the treatment and rehabilitation of the elderly. They help breast cancer patients with treatment and rehabilitation from four aspects: (1) cognitive education, (2) patient care, (3) community support, (4) smart health care.

Service design in cognitive education

In 2013, the project "Staying the Course" from the Royal College of Art (RCA) aims to help breast cancer patients to take medication at home. The study revealed that education is the most important factor affecting compliance, also that smartphone technology is useful in people's lifestyle and routines. They found that most patients learn about their medications only in one initial session with the cancer care nurse. This session covers the different drugs, when and how they need to be taken, as well as the side effects that may be experienced. The patients need to remember a lot of things which make them feel stressed and worried. The main research output is a smartphone app, developed to support patients during the education session with the nurse. This provides relevant information about their specific treatment, and patients can review the different elements of their treatment that are confusing or unclear (Riadigos, 2013).

Service design in patient care

National Breast Cancer Foundation (NBCF) develop HOPE Kits which are filled with thoughtful items: unscented lotion, fuzzy socks, tea, "Hope is Stronger than Fear" bracelet, hope journal, lip balm, education resources, etc. The patients would feel comforting and encouraging while undergoing breast cancer treatment after they receive this kit. Because NBCF is a public welfare organization, it offers five ways to get involved: (1) donate, sponsor a Hope kit for a woman with breast cancer; (2) send, send a HOPE Kit to a loved one facing breast cancer; (3) volunteer, pack or prepare contents for HOPE Kits; (4) fundraise, raise funds and deliver HOPE Kits locally; (5) partner, support HOPE Kits through gift-in-kind and sponsorship.

Figure 1: HOPE Kit (Source: National Breast Cancer Foundation website)

Service design in community support

In 2018, North-eastern Illinois University presents a mobile application named My Guide to improve symptom burden and health-related quality of life among Hispanic women who have completed active treatment for breast cancer by increasing their health literacy (Iacobelli et al., 2018). They developed a community-supported approach to building the application, which involved eliciting feedback from community leaders, conducting a formal evaluation of design principles based on previous interaction design research and user responses and incorporating feedback from potential future users.

Figure 2: My Guide (Source: Iacobelli et al., 2018)

In China, the application "Breast Cancer Home" has three main functions: the circle of patients, the establishment of a communication platform for breast cancer patients; anti-cancer knowledge, pushing the authority of anti-cancer knowledge; similar medical records, finding similar patients, and viewing the relevant treatment programs.

Figure 3: The interface of application 'Breast Cancer Home' (Source: the application "Breast Cancer Home")

1. Service design in smart health care

Mayo Clinic Application has revolutionized the relationship between health applications and users in the past. In the past, the data provided by health applications were isolated and one-sided, so users could not get a comprehensive understanding of their health status. By using the research results of Mayo Clinic in patient education for many years, and using the application software of Healthkit, it provided patients with customized health management programs. In the hospital treatment scenario, each department will make the consultation seamless by the way of intelligent collaboration. In the course of breast cancer treatment, Mayo Clinic doctors will coordinate with the local doctors in the patient's location, invite local doctors to provide chemotherapy and other medication to save patient time.

Figure 4: Mayo Clinic (Source: Mayo Clinic website)

In China, there are some cases of smart medical care, such as the wisdom hospital of Beijing University People's Hospital, the Shaoyifu Hospital of Zhejiang University, etc. The smart medical care mainly focuses on the internal management of the hospital and the electronification of the patient's medical treatment process.

All of these designs show that service design plays an important role in improving the treatment, rehabilitation and quality of life of the patients. In addition, a large number of studies have shown that the health-related quality of life of breast cancer patients can be improved through patient care psychological intervention and community support (Zhang & Tong, 2008; Peng, 2016).

Research purpose

Existing researches have proven that service design can improve the physical and psychological discomfort of elderly patients during treatment and rehabilitation. Therefore, in this research, the research team hopes to

combine the new technology and social trends through service design to enhance the health-related quality of life of elderly breast cancer patients in Shanghai during treatment and rehabilitation.

Design Process and Methodology

In 2018, the research team conducted field research on three hospitals and serval neighbouring residential communities in Shanghai. And then the research team conducted in-depth interviews and did records with 17 people from Shanghai, including 6 elderly women with breast cancer, 7 family members, and 4 breast surgeons.

Service design allows us to not only focus on the data, but also through in-depth interviews, insights, role-playing, and the establishment of empathy and other service design methods to understand the real needs and perspectives of patients. As Wendy Perchick from ZGF company said:

> Patients have the power of choice—they own this facility and design their own experience. A patient told me that he felt the healing intensified here because he felt so relaxed. (Perchick, 2018)

Research standard based on HRQOL system

In this study, the research team adopted the standard system of Health-Related Quality of Life. Health-Related Quality of Life (HRQOL) refers to the assessment of health status and subjective satisfaction associated with personal life events under the influence of illness, accidental injury and medical intervention. Centers for Disease Control and Prevention defines HRQOL as:

> Health-related quality of life (HRQOL) is a multi-dimensional concept that includes domains related to physical, mental, emotional, and social functioning. It goes beyond direct measures of population health, life expectancy, and causes of death, and focuses on the impact health status has on quality of life. A related concept of HRQOL is well-being, which assesses the positive aspects of a person's life, such as positive emotions and life satisfaction. (Centers for Disease Control and Prevention)

HRQOL is an important refinement that plays to the needs of elderly people. Medical workers have generally accepted the view that "for cancer patients, survival or disease-free survival is an important evaluation index, and health-related quality of life is the basis". The evaluation of the health-related quality of life of cancer patients has become one of the endpoints of cancer clinical research (Zheng et al., 2007).

Through the analysis and refinement of HRQOL, we can conduct research and insight into service design from a medical point of view, and also provide direction for subsequent service output. Patients of different cultures and values have different experiences of their life goals, expectations and standards, and the state of life-related to the things they care about, including physical function, mental function, role function, social function, and overall feeling of health.

Figure 5: Health-related quality of life (Source: authors)

1. Physical function refers to individual activity and physical strength. It mainly includes physical activity, self-care ability, and physical strength.
2. Psychological function mainly refers to emotional reactions (anxiety, depression, stress, etc.) and cognitive function (attention, memory, thinking ability, etc.). Both disease and environmental factors can bring psychological changes to patients.
3. Role function refers to the effect of disease on the work or study or housework of the patient.
4. Social function refers to the quality and quantity of an individual's social network, such as the frequency of contact with family, friends and other intimate relationship.
5. The overall feeling of health status is self-evaluation by the patient's satisfaction with his or her health status, reflecting the patient's subjective feelings about his or her life.

Under the systematic standard of HRQOL, the research team members developed the research strategy: Through the observation and tracking of the behaviors of elderly breast cancer patients in different scenes to find their behaviors and processes. Afterwards, conducting in-depth interviews and guide narration with stakeholders such as elderly breast cancer patients, family members and medical staff to help them recall the problems (physical, psychological, social, role and overall feelings) in the process of treatment and rehabilitation. In this way, we can find insights about their explicit and implicit needs, and then determine the service design directions to improve patients' health-related life quality, and the touchpoints to improve patients' emotional experience, so as to provide a basis for the proposal of later service strategies.

Figure 6：Research strategy (Source: authors)

Field observation

According to the treatment and rehabilitation process of elderly patients, the research team divided the scene into three parts: medical service scenario in hospital, family care scenario, community mutual assistance scenario.

In 2018, the research team conducted field research on three hospitals and serval neighbouring residential communities in Shanghai. The research team members observed the three service scenarios and took pictures of relevant service scenarios. Then we corresponded the service scenarios photos with user behaviour and conducted in-depth interviews and follow-up observations with stakeholders (elderly breast cancer patients, family members, doctors, and nurses).

Medical service scenario in hospital:

The hospital's treatment scenario is the most important scenario for patient treatment. In the investigation of hospitals in Shanghai, the research team divided the hospital treatment scene into three parts: hospitalization, surgery and daytime chemotherapy.

Figure 7: Medical service scenario in hospital (Source: photos taken by authors)

After diagnosis, according to different levels of cancer, elderly patients need to undergo hospitalization, chemotherapy and surgery. Through field observation, the research team found that the phenomena in the hospitalization scenario: (1) The accompanying staff were mostly children or husbands, but they rarely chatted with each other, (2) The patient's activities were limited to walking in the corridor, rarely going downstairs, (3) It's difficult for patients to go to the bathroom when they were infused, and they need help from others, (4) The wards were two-person or three-person rooms, sometimes patients would be disturbed by others (lights, sounds), (5) Chemotherapy led to hair loss, loss of appetite, vomiting, sweating and other physical discomfort.

After the condition is stable, the patient would start daytime chemotherapy. In the service scenario of daytime chemotherapy, the research team found that: (1) The patient need to wait for 1-2 hours before infusion. The waiting time was long. (2) It took one day for patients to do daytime chemotherapy, but because of the limitation of hospital space, they can only sit. (3) It's inconvenient for patients to check infusion progress.

Family care scenario:

In the nursing environment of the family, the degree of tension of the patient is low, and the mood tends to be gentle. Home nursing has an important influence on follow-up treatment, rehabilitation exercise and psychological recovery. The current phenomena were as follows :(1) the rehabilitation exercises were monotone and hard to insist on; (2) the elderly patients were retired people, who often stay at home and seldom communicate with others.

Community mutual assistance scenario:

At present, community mutual assistance is mainly divided into online community mutual assistance and offline real community mutual assistance. By investigating online communities (breast cancer homes, breast cancer control, and health-loving businesses), the research team found that few elderly women are active on online communication platforms.

Regarding the offline real community mutual assistance, the research team investigated the hospital-based patient support community. The members of the platform are breast cancer patients who have been treated in Shanghai hospital and volunteers from all walks of life. The platform regularly organizes activities and lectures to help doctors and patients, patients and patients communicate with each other. It is a targeted and efficient mutual help platform. The phenomena in this scene were: (1) the patient was willing to communicate with people who have the same condition and the same feelings. (2) Compared with the hospital scene, the offline community scene was warmer and the patient was more relaxed.

Figure 8: Offline community mutual assistance scenario (Source: Yankang organization)

In-depth interviews

The research team conducted in-depth interviews and did records with 17 people from Shanghai, including 6 breast cancer patients, 7 family members, and 4 breast surgeons. We summarized the problems of HRQOL, interviewed elderly women patients, family members and doctors, and displayed pictures in detail to arouse their memory in the course of treatment and rehabilitation.

Elderly breast cancer patients: In terms of treatment, many patients said that they would consider choosing a hospital close to the community for treatment. The main reason was that it was convenient to arrive, but there was also the fear that "the big hospital was better than the community hospital". During the treatment, the problems were mainly due to the lack of understanding of related technical terms and strong physical response during chemotherapy.

On the psychological side, most of the elderly had shown an optimistic attitude and actively cooperate with the treatment, but sometimes they still felt sad and anxious. Ms. Hu (62-year-old) said: " On the day before the operation, I told the patient who next to me, 'After taking the shower today, I will not be complete tomorrow.' I cried in the toilet for a long time that night."

When it comes to the problems of rehabilitation at home, many elderly people said that it was difficult to perform rehabilitation training at home, which caused arm edema. Most elderly patients expressed their willingness to chat and engage in activities with people who were similar to themselves. They thought that "they had the same illness, they felt the same way, and I was willing to listen to them."

Family members: In the care of the treatment, most of the family members said that the feeling of accompanying the night was poor, mainly due to the limited space of the hospital and the need to check the patient's situation at any time. At the stage of home rehabilitation, many family members said that sometimes they would be too nervous about the physical condition of the patients, and some families became full-time "free carer" because of their restlessness.

Breast doctors: In terms of treatment, doctors said that some patients or their families would frequently ask them about the patients' situation because of fear, causing trouble in their normal work. Doctors also said that they were very willing to care about the patient's physical condition and would do their best to help patients. About the rehabilitation, one doctor said that the patient would be told to do rehabilitation exercise every day, but due to the limited space, they cannot be carried out in the hospital.

Figure 9: In-depth interviews & guiding narrative & journey map (Source: photos taken by authors)

Journey map and stakeholder map

Through field observation, in-depth interviews and analysis, the research team came up with journey map and stakeholder map to clarify the impact at each stage in the service.

The journey map mainly describes three aspects: (1) the behaviours of elderly breast cancer patients during treatment (2) the corresponding scenes (3) mood curve.

Figure 10: Journey map – Treatment of elderly patients with breast cancer in hospital in Shanghai (Source: authors)

The stakeholder map primarily illustrates existing and potential relationships of elderly breast cancer patients. The different distances on this map represent different relationships among them. The bigger the distance between them, the smaller the relationship, the smaller the distance, the bigger the relationship.
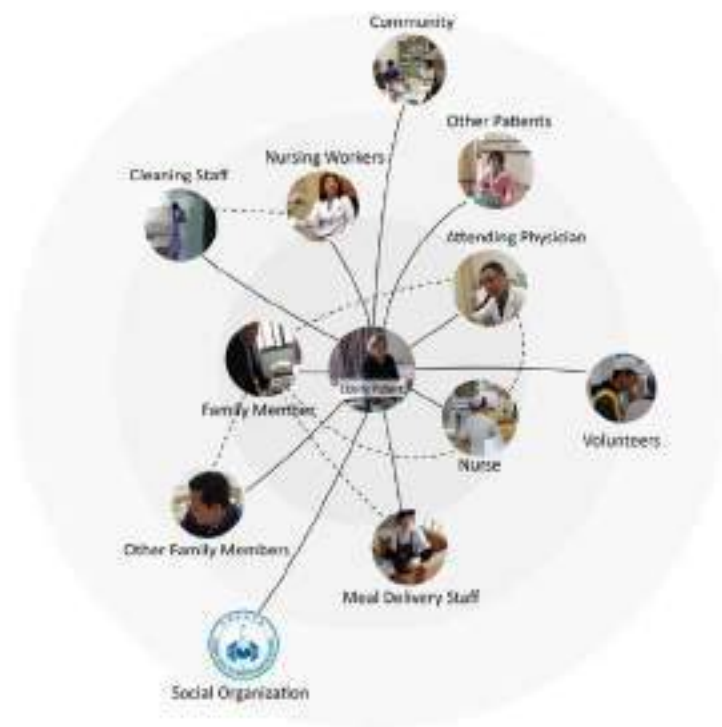
Figure 11: Stakeholder map (Source: authors)

Insight

The main reasons for the decline in HRQOL in breast cancer patients during treatment and rehabilitation are as follows:

Physical function:

1. After the operation, the ability of self-care and activity is limited.
1. Patients need to endure cancer pain and chemotherapy radiotherapy. There will be physical discomfort such as vomiting, hair loss, constipation, sweating, numbness or stinging of hands and feet, skin changes, nausea, loss of appetite, tightness or difficulty breathing.
2. Elderly patients often have complications such as diabetes and high blood pressure.

Role function and social function:

1. Physical discomforts and some complications make elderly patients cannot carry out the normal living and social activities. These problems affect the role and social function of patients to a certain extent.
3. The ability of knowledge acceptance, understanding, and learning of elderly patients is weaker than that of young people. They may not understand the efficacy of drugs and the rehabilitation manual.
4. Nurses in hospitals often neglect the needs of patients' spouses for disease knowledge and rehabilitation knowledge. Patients' spouses sometimes don't know how to communicate with patients.
5. Most breast cancer patients without special complications will choose to go home for rehabilitation. It takes half a year or more time for patients to recover. Patients and their families are plagued by "adaptation" and "care".

Psychological function:

1. Elderly patients are more traditional in ideology, but they have to bear the tremendous pressure brought by physical changes, which cause them to have negative emotions such as anxiety, depression, pessimism, and inferiority.
6. Social roles changing make elderly patients more dependent on their families, which brings loneliness and frustration to the patients.

Through the collation and analysis, the research team got the corresponding direction of service design. In the physical function part, because mainly problems are caused by medical problems such as surgery, service design is difficult to directly intervene. As to role function, social function and psychological function, elderly women cannot live and socialize normally because of physical pain or change. They need to bear great psychological pressure. Service design can create a high-quality living environment for elderly women with breast cancer by introducing products, interaction, experience and other design.
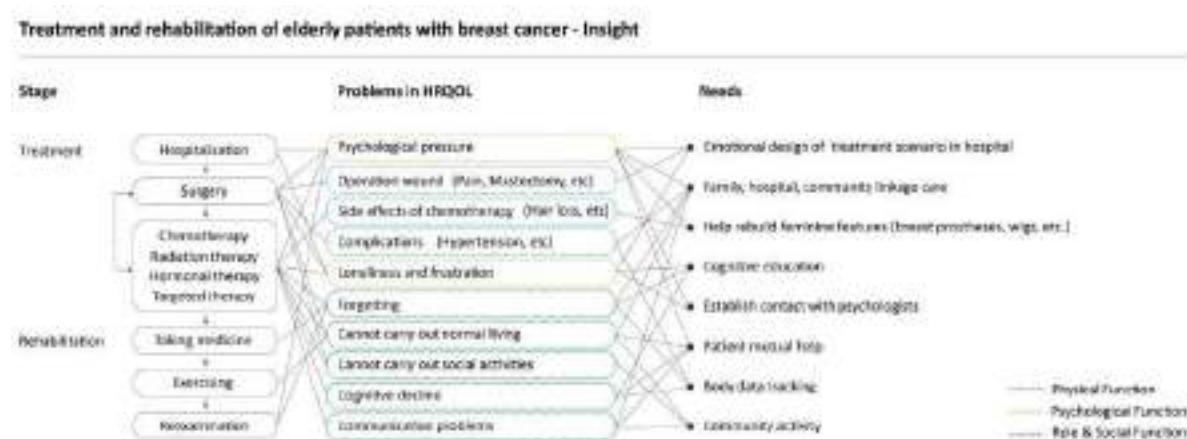
Figure 12: Insight – Problems in elderly women with breast cancer's HRQOL in Shanghai (Source: authors)

Findings and Discussion

Through literature collation and analysis, research and co-creation, the research team carry out service design in the following aspects to help elderly women with breast cancer improve health-related quality of life.

Internet +

At present, the number of elderly Internet users in China has reached as high as 8.28 million, accounting for 20% of the elderly population (Tencent, 2018). That means, one in five elderly people use mobile phones to access the Internet. In the past five years, the speed of Internet access for the elderly is 1.6 times faster than the overall speed of mobile Internet popularization. The elderly people are embracing mobile Internet life with smart phones. Breast cancer treatment and rehabilitation is a long-term, dynamic and professional practice process. There are many nursing problems and needs of patients, including post-operative rehabilitation, symptoms management during chemotherapy. It is urgent to have long-term and timely guidance from professionals. Mobile medicine, which has sprung up in recent years, is the best way to meet this need.

In December 2013, American authors Jacqueline Lorene Bender jointly evaluated 295 mobile phone apps for cancer. The study found that most apps are about raising awareness of cancer (32% of the total number of apps), followed by information about cancer education (26%), and some apps to raise money (Bender, Yue, To, Deacken & Jadad, 2013). In the Internet + breast cancer related applications, the application of mobile intervention technology in the field of breast cancer care penetrates from the disease prevention stage to the disease rehabilitation stage. Comprehensive analysis of mobile applications, websites and WeChat public accounts at home and abroad found that their functions and characteristics are mainly distributed in four aspects: patient self-management, online consultation, patient community, and medical information.

Smart health care for hospital service scenarios

As the core component of traditional health care service industry, all kinds of institutions providing professional health care services (medical groups, large general hospitals, specialized hospitals, community hospitals, physical examination centres, etc.) are also using their own high-quality resources combined with Internet +.

Elderly women with breast cancer have strong needs in the treatment and rehabilitation of diseases and psychological state. The Mobile Medical Ecosystem Model designed by Meng fully mobilizes the enthusiasm of all stakeholders and realizes the transformation from doctor-led situational service to patient-centred continuous service (Meng, Hu, Qu & Li, 2013). This ecosystem emphasizes the interaction of various stakeholders, including the environment, individual attributes and social relations, cultural level, technology and medical resources that affect individual health. Through this ecosystem, patients can better manage their own health and make better decisions when diseases occur, thereby improving the health-related quality of life.

Family and community care

At present, there are 130,000 cancer patients in Shanghai. About 100,000 of them have returned to their families and lived in communities after completing clinical treatment and stabilizing their condition (Zheng et al., 2007). Cancer, unlike other diseases, is closely related to pain and death. Psychological problems of many patients may replace physiological problems and become the main problems faced by patients themselves, their families and community doctors.

In order to improve the curative effect and quality of life of elderly female breast cancer patients in their later years, it is necessary not only for the hospital to put forward a more individual diagnosis and treatment plan, but also for the cooperation of family, society and the overall environment. Through service design to build a life-long service system, focus on the whole life cycle, through community hospitals as the centre of health care services, to make it become chronic diseases.

The home care services should consist of three elements: (1) Homecare plan, (2) Patient homework execution form, (3) Returning visit and telephone consultation.

1. Homecare plan: After treatment, the smart platform will automatically generate evaluation results and suggestions. The analysis table of breast cancer patient evaluation and management was generated through the smart system platform, and the home care plan was developed by the medical staff and community nurses.

7. Patient homework execution form: The community nurses guide the patient to carry on the family rehabilitation training, so the patient can get better home rehabilitation with the help of family and community nurses.
8. Returning visit and telephone consultation: After every returning visit and telephone consultation, the community nurse fills in the relevant information of the questionnaire and summarize the assessment results. Then, feedback the information to the medical staff in time.

Community nurses provide one-to-one health education for breast cancer patients through information management of chronic diseases and home care services and record the health indicators of breast cancer patients into health records. Individualized rehabilitation training programs and health intervention programs were generated through information-based chronic disease management platform, which gave the feedback to breast cancer patients for the new plan.

A life-long service system for elderly women with breast cancer

In the life-long service system for elderly breast cancer patients, the researchers corresponded the functions of HRQOL to the main stakeholders: The elderly breast cancer patients are located in the centre, including their physical and psychological characteristics; the second level is the interpersonal relationship, including family members, friends and social workers who communicate with elderly breast cancer patients; the third level is organizational factors, including hospitals and professional organizations related to the diagnosis and treatment process of elderly breast cancer patients; the fourth level is community, representing the small size of elderly breast cancer patients. The scope of the environment, including community support agencies, community media and so on; the fifth level is related to elderly breast cancer policies and laws, including breast cancer screening policies.

With the cooperation of stakeholders (elderly breast cancer patients, patients' families, community personnel, attending physicians, nurses), under the new situation of family-hospital-community and smart healthcare, we design a system map to enhance patients' HRQOL by collecting data, cooperating with hospital and community. The details of a life-long service design system are as follows:

1. By creating a warm treatment environment to reduce the psychological pressure of patients during treatment.
2. Creating nursing services through Family, hospital and community linkage care to help patients with daily activities when they suffer from surgical wounds or pain. At the same time, enrich patients' social activities and establish certain social connections for patients.
3. By helping patients rebuild breast and other female characteristics to help patients improve self-identity, reduce psychological burden.
4. Through cognitive education, patients' awareness of the disease can be improved, and their panic caused by not understanding the disease can be alleviated. At the same time, it can also lay a foundation for the follow-up treatment of patients.
5. Reduce the psychological stress of patients by establishing contact with psychological experts.
6. Enhance patients' confidence in treatment and rehabilitation through mutual assistance and encouragement.
7. Enhance the patient's understanding of their situation through body data tracking.
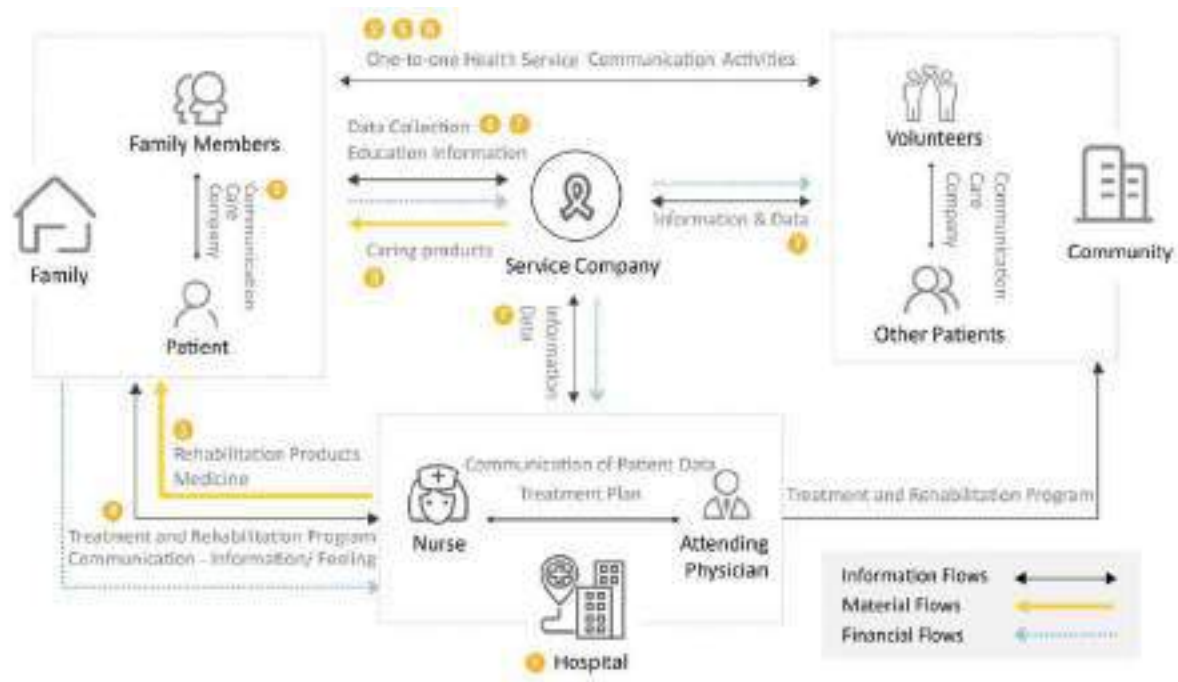
Figure 13: A life-long service system for elderly women with breast cancer (Source: authors)

Based on this service system and co-creation with stakeholders, the research team carried out the first step of touchpoints design. The research team created an emotional medical service scenario in a hospital in Shanghai, including wayfinding system for patient and family, corridors for families and patients to rest during treatment, and rest areas are designed to make doctors and patients communicate better.

Figure 14: Emotional medical service scenario in a hospital in Shanghai (Source: authors)

Conclusions and Suggestions

This paper reviews the literature on the decline of HRQOL (health-related quality of life) in elderly patients with breast cancer during treatment and rehabilitation. Through field observation, user tracking, in-depth

interviews and co-creation, the research team summarized the treatment needs, information needs and emotional needs that can improve patients' physical functions, social functions, role functions, psychological functions and overall feelings during treatment and rehabilitation. Patients, medical staff and designers discuss the details of the service experience and draw the following conclusions:

Under the system standard of HRQOL, the research team developed the research strategy to study the special needs of elderly breast cancer patients. Through behavioural tracking, guiding narrative and other service design research methods, the research team found the physiological needs, role needs, social needs and psychological needs of elderly female breast cancer patients.
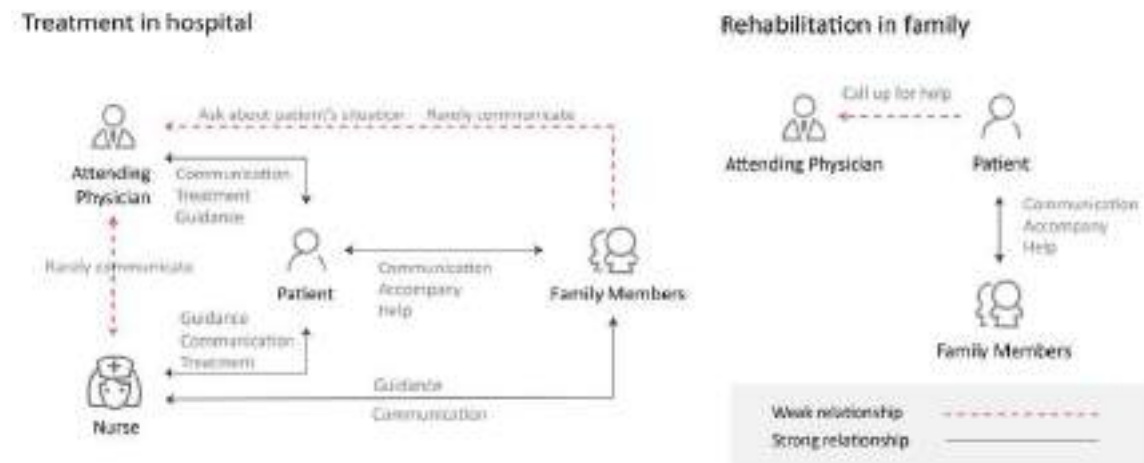
Figure 15: The existing model for elderly breast cancer patients' treatment and rehabilitation (Source: authors)

Based on the research, the authors build a life-long service system and design emotional hospital service scenarios to improve the health-related quality of life in the treatment and rehabilitation of elderly women with breast cancer in Shanghai:

1. Families, nurses, doctors and community workers cooperate with each other to help patients when they are unable to live a normal life.
2. By communicating with patients, family members and professionals, patients can enhance their enthusiasm and alleviate psychological pressure.
3. Community staff and nurses plan and guide patients' home-based rehabilitation, help patients correctly carry out rehabilitation training and follow-up treatment, reduce the possibility of complications caused by diseases, and make patients return to normal life faster.
4. Real-time interaction and connection with hospitals (doctors, nurses) and smart city medical services through data tracking of products such as smart wear can play the role of monitoring and treatment to the greatest extent, and enhance patients' sense of security and control of their own body.
5. Community is an important field of patients' daily life, and also a service place to learn scientific treatment concepts and correct treatment methods. It provides a platform for patients to learn and communicate daily.
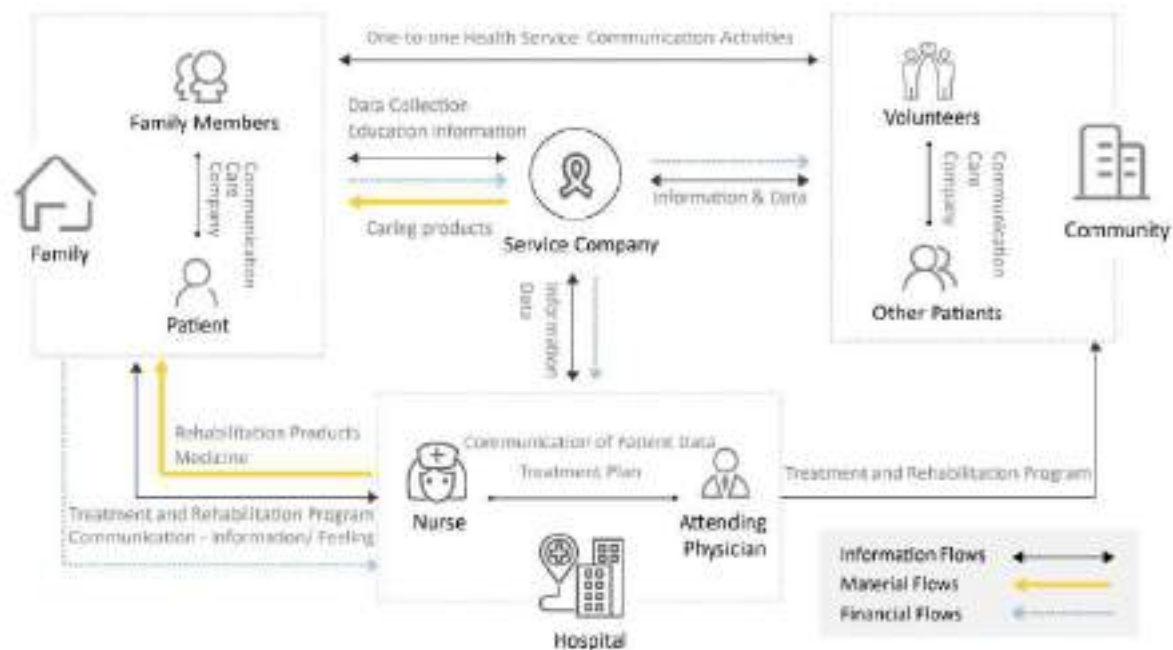
Figure 16: A life-long service system for elderly women with breast cancer (Source: authors)

The development of Internet technology, artificial intelligence and big data provides a technical foundation for building a life-long service. In the treatment and rehabilitation of breast cancer, surgery and chemotherapy are still the most important treatment methods. In the next step, the treatment and rehabilitation of elderly breast cancer patients need the joint efforts of multiple stakeholders (family members, nurses, attending physician, community workers), multiple departments (social insurance and government), and multiple services (social network communication and smart healthcare) in order to achieve good results and ensure the quality of life after treatment.

Acknowledgements:

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Engaging Senior Adults with Technology for Behavior Change

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Amidst today's ever-expanding waistlines there is a clear need to investigate technology's potential to support behavior change and stimulate increased physical activity. Physical activity has also been shown to increase the independence and well-being of older adults, yet an important segment of this community is often excluded from the necessary in-context research due to the barriers they face to technology acceptance. Currently, there is limited knowledge on how to overcome these barriers to participation. We created a specific Product Service System that supports older adults to engage with the proposed technological interventions to enable important in-context behavior change research. Our approach converges knowledge from the domains of living laboratories, co-design, and existing experience of design research with older adults. From our experiences with this Product Service System, we provide guidelines to support other researchers setting-up a living laboratory study with older adults to explore technology's potential to motivate behavior change.

Keywords Older adults, Behavior change, Living labs, technology acceptance, Physical activity

Introduction

The benefits of physical activity are well recognized. According to Bauman et al. (2016), physical activity can not only reduce the risk of chronic disease among older adults but also reverse symptoms of frailty, by, e.g., making physical activity instrumental to fall prevention (Bangsbo et al., 2019; Bauman, Merom, Bull, Buchner, & Singh, 2016; Chodzko-Zajko, Schwingel, & Park, 2009; Lopez et al., 2018). Most importantly, physical activity supports older adult's independence and overall quality of life.

The domain of behavior change (BC) focuses on understanding and facilitating the process of changing habits; from current behavior patterns to the adoption of new target behaviors. Personalized BC strategies can be implemented to spark, facilitate or support the process of adopting new habits. Technologies, such as wearable activity trackers and smart phones, have the potential to offer personalized BC solutions to motivate sedentary people to live more actively (Al Ayubi, Parmanto, Branch, & Ding, 2014; Mitzner et al., 2010; Valenzuela et al., 2018). Research into BC strategies can support a better understanding of how we can take advantage of these new technologies to motivate older adults who could benefit from increased physical activity to adopt a more active lifestyle. However, BC is a dynamic process which is susceptible to changes in time and place or context and thus challenging to investigate without an appropriate approach. Living Laboratories (labs) are valuable methods for in-context research and vital to investigate BC strategies (Eriksson, Niitamo, Oyj, & Kulkki, 2005; Wu, 2018).

Though it is clear that older adults have much to gain from the development of technologies which motivate BC towards a more active lifestyle, there is an important sub-group of older adults who are barred from participating in the necessary in-context research due to their relatively low level of technology acceptance (Anderson, Perrin, Smith, & Page, 2017; EuroStat, 2019). It is important to enable this group of people to participate in the development of personalized BC solutions not only because they offer a unique perspective but also be because excluding them from development of these solutions will likely also exclude them from the benefit of these solutions and missing out on the support they need to attain more active, healthy, independent and happy lives. Therefore, researchers should be aware of specific considerations to involve older adults in the living lab research process (Eisma et al., 2004), necessary to investigate how to use BC strategies to support active living.

Initially, our aim was to conduct an in-context investigation, using mobile technologies to compare the effectiveness of two different BC strategies. Though this initial plan yielded interesting results, we found that the setup and execution of this research resulted in insights which would be useful to share with members of the community interested in conducting similar investigations.

In this paper, we report on our study design, setup and execution in order to share how we were able to address barriers to technology acceptance and facilitate an inclusive study to compare BC strategies. To this end, we will present some guidelines to set up a platform to design BC studies for older adults in a living lab context. With knowledge gathered on this topic from various areas of literature, we tailored an existing Product Service System (PSS) to enable BC research in a living lab context with older adult participants. This PSS was implemented to do a research study comparing motivational strategies. A reflection on our implementation of this PSS suggested that a PSS approach to a living lab research study design has potential to overcome the barriers preventing older adults from participating in such researches. The purpose of this paper is to share our reflections on our process to provide inspiration to other practitioners who aim to conduct related studies.

Related Work

To best position our contribution in this paper, we will discuss certain areas of related work pertaining to the advantages of using a living lab research method for behavior change research, technology acceptance as a barrier many older adults face to participate in these living lab studies and a review of the guidelines other authors suggest to address for this topic.

Research toward the development of behavior change solutions

Behavior change (BC) is a dynamic process describing the adoption of new habits and routines sometimes in the place of old ones. Due to the dynamic nature of this process it is important to conduct research about BC in the context of use of the intervention. Often the behaviors in question cannot be simulated in a lab environment and nor could the complex web of naturally occurring facilitators and barriers to adoption of the new behaviors. Thus, in-context BC research into how to motivate older adults to live healthy and active lives has become increasingly important, however there are few examples of this kind. Authors Wu Munteanu, 2018, write about a study they did in which they co-created and then field tested a fall risk assessment belt with older adults (Wu & Munteanu, 2018). However, they report that their five study participants were chosen on convenience and likely do not represent a good cross-section of the very diverse older adult population as all of them had either high or medium familiarity with mobile devices (Wu & Munteanu, 2018). The use of a living lab in BC research is accepted as a valuable method for the necessary in-context research. The advantage to living lab investigations is that living labs can offer a more realistic view of how an intervention will be used (and possibly misused) in the user's regular day to day context (Hopfgartner et al., 2014). In "Benchmarking News Recommendations in a Living Lab" author Hopfgartner et al. found living lab studies and studies conducted in a laboratory setting had different outcomes. This paper supports the view that living labs can offer a more realistic view of how an intervention will be used in the user's regular day-to-day context. In Hopfgartner's discussion speaks to the "various issues" that need to be addressed in order to do living lab research (Hopfgartner, et al., 2014). The limited examples of studies which do follow up co-design of new technologies with implementation and field testing, might not address but rather avoid barriers like lack of technology acceptance among older adult participants.

Barriers to research engagement

The increased availability of smart phones and wearable activity trackers pose intriguing new opportunities for personal health monitoring. In a systematic review of 26 articles about the viability of smartphone use for measuring and influencing physical activity, Bort-Roig et al. found that though these articles reported generally positive accuracy measurements, novel diversity and users' impression of usability, illustrate the potential wearable technologies have to promote physical activity (Bort-Roig, Gilson, Puig-Ribera, Contreras, & Trost, 2014). Vollmerdahlke and Ory report that mobile applications have already been used for a variety of kinds of health promotion goals including increasing physical activity, to show that mobile technology for health promotion has the potential to be embraced by older adults, however the authors express the need for a better understanding of usability, accessibility, perceived benefit, and relevance to the older adult individuals specific socio-demographics (Vollmer Dahlke & Ory, 2016). Though, mobile health applications already show potential to support healthy and active ageing, more research is required to adapt these developing technologies to make them appropriate to address the needs of older adults (Helbostad et al., 2017). It is clear that mobile technology's propensity to support BC toward increased physical activity is worth investigating. Moreover, in order to take full advantage of this potential more research needs to be conducted into how we can develop technological solutions, which address the older adult end user in valuable ways.

Despite the clear potential technology offers, there are still barriers to technology acceptance to address. The older adult population is comprised of highly diverse individuals, but there are some important factors that present barriers to a subgroup of older adults preventing them from engaging in design research, which should not go unnoticed nor unaddressed. In particular, the barriers to technology acceptance many older adults experience, present barriers to research engagement (K. Chen & Chan, 2011; Mitzner et al., 2010; Valenzuela et al., 2018). While 93% of Europeans aged 25 to 54 reported having used the internet in the last three months, for people aged 55 to 64 this was 73% and for people aged 65 to 74 this percentage was even lower; 52% (EuroStat, 2018). Besides a lack of experience with technologies many new technologies do not adequately consider the mental and physical challenges some older adults may face when using this technology, such as decreased dexterity or lack of procedural knowledge (Holzinger, Searle, & Nischelwitzer, 2007; Vollmer Dahlke & Ory, 2016). It can be challenging to engage older adults who have limited experience with digital devices to join research studies centered around exploring technology's potential (Eisma et al., 2004; Kopeć, Nielek, & Wierzbicki, 2018). Though co-designing technological interventions, and in context testing, can support technology acceptance among older adults, barriers exist preventing researchers from taking advantage of these valuable research methods (Binda, Wang, & Carroll, 2018; Eisma et al., 2004; Harrington, Wilcox, Rogers, & Connelly, 2018; Holroyd-leduc et al., 2016).

It is vital to overcome the barriers to technology acceptance in order to make research of technologies to support BC more inclusive, because exclusion from development results in exclusion from these projected benefits. The important challenge which needs to be addressed is; how can we enable older adults with low technology acceptance to engage in research about technologies potential to support BC?

Review of existing guidelines

Experienced authors have already contributed to the body of knowledge of how to set up design research with older adults. Holroyd-Leduc, et al. reported on six points to consider when designing a research study to include older adults with frailty (Holroyd-leduc et al., 2016) while Eisma et al. 2004, provided a more extensive list of recommendations including advice on different methods to obtain information (Eisma et al., 2004). Though it was not our purpose to conduct a literary review, below we share guidelines from some other authors who's work and recommendations inspired our research setup for this investigation.

List of guidelines, which inspired our approach:

- Researchers should be in practical arrangements, adaptable during workshops in accordance with user needs and open to new ways to perceive, define and think about ageing (Binda et al., 2018; Holroyd-Leduc et al., 2016; Malmborg, Werner, Grönvall, Messeter, & Raben, 2015)

- Researcher should consider the participants specific needs including, but not limited to, impaired visibility (Binda et al., 2018; Holroyd-Leduc et al., 2016)

- Take the time to facilitate use of technology in context, to understand and respect every day practices, which ad hoc infrastructures constitute a community and what tools can be used in the co-design sessions (Harrington et al., 2018; Malmborg et al., 2015)

- Consider education or training of care providers and researchers on engagement practices (Holroyd-leduc et al., 2016)

- Leverage experience with technology even if gained prior to study (Harrington et al., 2018)

- There may be a need to incentivize participation (Holroyd-leduc et al., 2016)

- Actively engage the older adult participants by breaking the ice, playing games, doing workshops, and find ways to facilitate participants to actively engage with each other (Binda et al., 2018; Harrington et al., 2018)

This body of knowledge describes how to interact with participants and stakeholders during the test, yet provides little clarity on how to design the setup of in-context study of technology intervention toward BC.

In this paper, we describe how we facilitated in-context research to enable older adults with limited technology acceptance overcome barriers to research participation. The purpose of sharing our experiences is to enter the conversation on how to design meaningful products and services which motivate the increased physical activity, with and for older adults.

Initial Study Setup: In-context research to compare BC strategies

In the REACH Horizon 2020 project case, we aimed to conduct a random control trial to evaluate the effects of two different persuasive strategies on BC through a mobile application with older adults. For this investigation we planned to make two very similar mobile applications one of which would use the BC strategy self-reflection and the other application would use social reflection (these participants would work together with one partnering participant towards a common activity goal). As seen in figure 1, we allowed for a four-week baseline to allow participants to get used to the activity tracker and the smart phone. In workshop two we introduced the intervention applications. After workshop two participants were asked to use the mobile application throughout a period of 5 weeks in their natural home context. In total, 65 older adult participants were recruited via a local senior community center and onboarded in workshop one (figure 1). Of the 58 participants who finished the entire trial period, 43 were female and 15 were male and together their average age was 72.47 and the median age was 73.
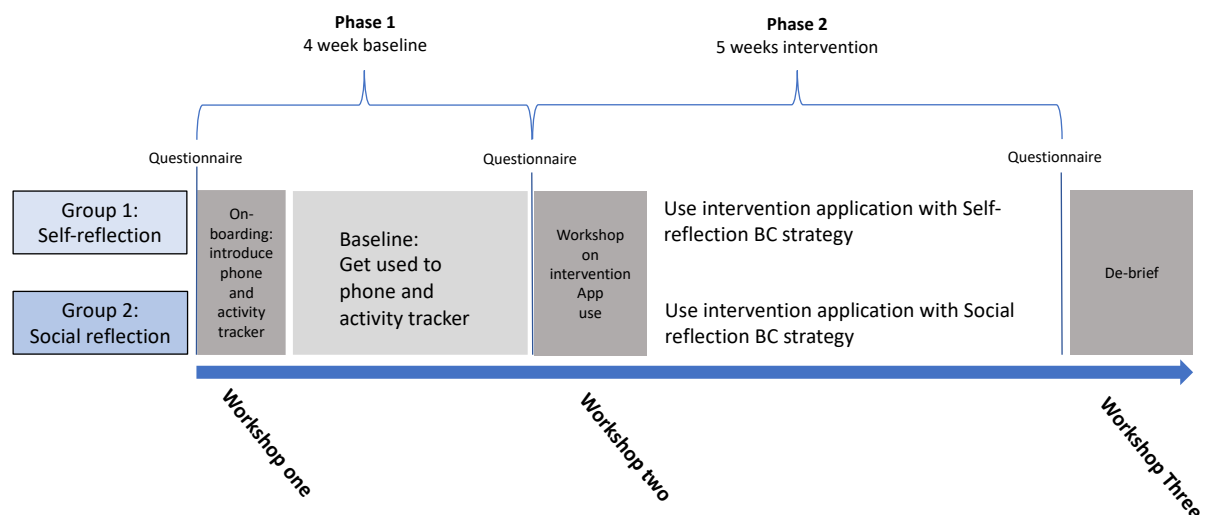
Figure 1. Simple outline of In-context research to compare BC strategies study

Setting up valuable research of this kind requires overcoming barriers to technology so that the interventions in question are acceptable for use to the participants, and collaboration between the stakeholders involved in this context. We aimed to design a study to engage older adults with limited technology acceptance with in-context BC research. First, we needed to develop the two intervention applications in such a way that these

were appropriate and usable for participants with limited expertise with technology. Next, we needed to find ways to deliver on-going facilitation to support the in-context use of the intervention applications over the course of study duration.

Results

The resulting study design aimed to engage older adults with limited technology acceptance with in-context BC research. We overcame barriers to technology in part by re-designing existing test applications through a co-design study with a panel of older adult participants. In order to compare the intervention application in-context we set up a living lab with a local senior community activity center. To deliver on-going facilitation throughout the duration of the study it was necessary for us to take a Product Service System (PSS) approach to the set up and execution of this research study. We used Lee and Kim's, 2010, modified service blueprint to consider the following important aspects of our PSS approach:

- **Product and service elements layer** refers to the elements that participants interacted with during the entire research study period.
- **Service receiver study participant layer** refers to activities that the participants undertook during the entire research study period.
- **Function interactions layer** refers to the activities that the design researchers conducted to create the activities of the participants.
- **Onstage service provider activities layer** refers to the activities that the living lab volunteers performed to support the on-going research study such as recruiting participating and technological support.
- **Backstage service provider activity layer** refers to the activities performed by design researchers in supporting the execution of the research study.
- **Support processes layer** refer to the data storage and management process in the background to support the execution of the research study.

Figure 2 shows how the resulted product service system platform for design research study. In the following, the detailed results per layer are discussed.
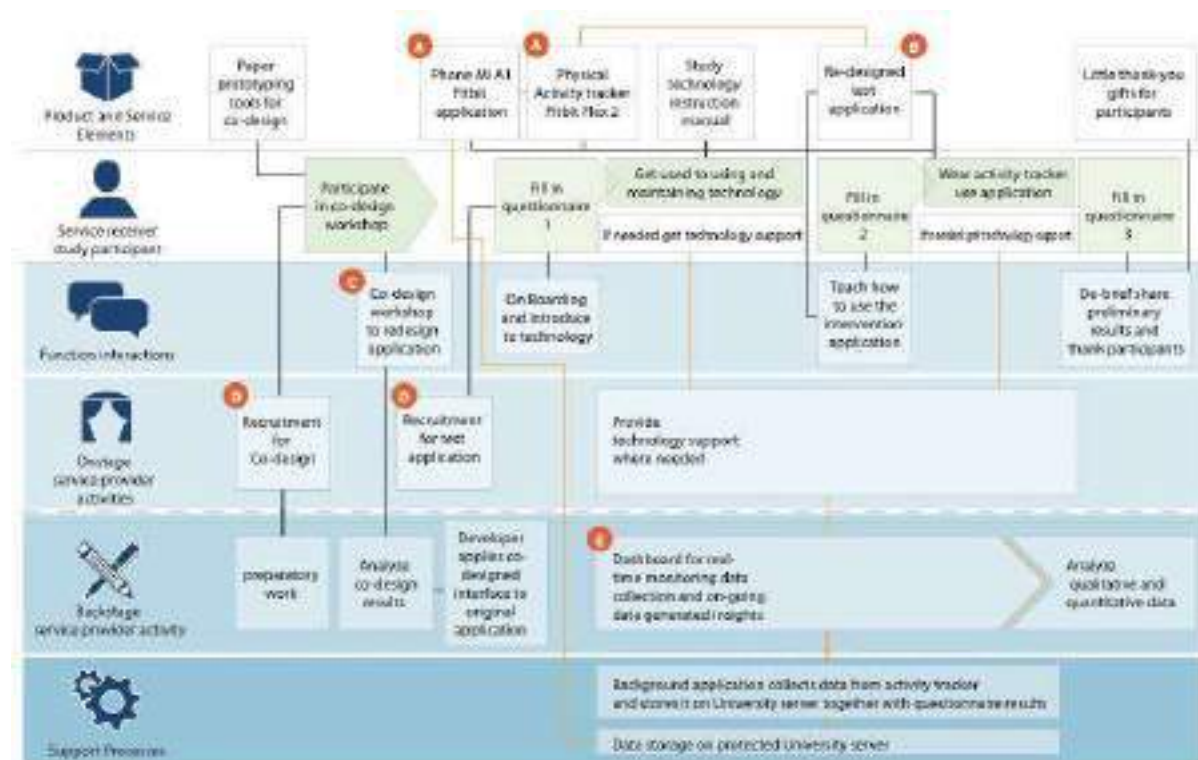
Figure 2. The product service system blueprint enabling living lab investigations to test BC strategies.

Functions Interactions layer

In this study, the function interactions can be seen as the main activities of the researchers in creating activities for the participants. It consists of four main activities: Co-design, on boarding, teach how to use the intervention applications and de-briefing. These activities are explained in detail below.

Co-design

Before the intervention application could be introduced to all the study participants, researchers collaborated with a focus group of five older adults with various degrees of experience with technology to re-design a test application through co-design process, refer to figure 2, C. It has been shown that co-designing mobile application with older adults has the potential to yield ideas that are creative and perceived as useful (Davidson & Jensen, 2013). In addition, Valk et al. (2018) has shown that end-user participating in the design process can contribute to technology acceptance (Valk, Lu, Randriambelonoro, & Jessen, 2018). This process provided researchers with a better understanding of the accessibility and usability of the technological probes used in this study and to ensure participants had a voice in the design/decision process for this research study. Figure 3 shows some results of the co-design session. This co-design study resulted in the design of the intervention applications used in this investigation, shown in figure 4.

Figure 3. Some results from the application re-design session

Figure 4. Resulting intervention application for investigation

On-boarding and introduction to technology

For this living lab study, in addition to regular on-boarding, participants were given a workshop to introduce them to all of the technological elements used in this investigation. In this workshop, researchers guided participants through all the necessary interaction steps of the study's baseline period using the study's custom manual. This thorough introduction was important to make the research inclusive for those with no or very limited prior knowledge on smartphone technology.

Teach how to use the application

To prevent overwhelming participants who might have limited experience with technology, participants were introduced to the intervention application after the baseline period of the test was done. During this informative session participants received the second chapter of the study specific visual manual and walked through all the functions of the application.

De-brief

During the De-brief session, participants were surprised with a little token of thanks, and a sneak-peek into preliminary findings made possible by the real time monitoring of the research dashboard. While this session allowed participants to provide useful feedback to researchers which will improve future studies. Most importantly, it was a moment for our research team to express their gratitude to participants and reiterate the importance of their contribution.

Service receiver activity layer

In this PSS the service receivers were the older adult participants of this living lab research study. Older adult participants were all community dwelling members of a local senior community center. It was advertised that prior experience with a smart phone was not a pre-requisite to participation, in order to recruit participants with various levels of technology acceptance.

Product and service elements layer

We used several different product and service elements to support the functions of this PSS.

Paper products

Paper prototyping tools were used during the co-design workshop, to prevent any barriers participating end-users may face using digital prototyping tools from hampering their input. In addition, a detailed visual manual was created, and provided in print, specifically for each condition in this study to support participants who had limited experience with technology. This manual was provided to each participant together with a letter detailing actions required during this study. The letter was included because we acknowledge that many participants might want to talk about their participation with friends and family, and this might facilitate these conversations.

Hardware elements

The product and service elements we used for this research study included an off-the-shelf phone, Mi A1, an off-the-shelf wearable activity tracker, Fitbit Flex2, and we tailored an existing probe to test motivational strategies, see figure 2, A. The existing probe was a mobile application initially designed to test motivational strategies by researchers from École Polytechnique Fédérale de Lausanne (Y. Chen & Pu, 2014), figure 2, B. We redesigned this mobile application, through a co-design session with older adults, figure 2, C. While developers implemented changes suggested by the analysis of the results of the co-design re-design session, other members of the research team created detailed visual manuals for the phone and wearable tracker, inspired by the co-design session.

Onstage service provider activity layer

Existing close positive relationships with a senior community center also partnering in the REACH consortium allowed us to delegate most of the recruitment for the larger study, though researchers did provide flyers clearly explaining the goal of the research, and the expected commitment for participation, figure 2, D.

During the participant on-boarding process, the research team created an open and inviting atmosphere. They explained the study protocol, aim and various privacy security measures that were taken. Researchers often reminded participants of why their contributions are so valuable and worked to show participants their appreciation, by thanking them for their feedback at the end of every session, sharing preliminary insights during a debrief meeting and giving them a small gift as a token of appreciation at the end of the study. We feel the open atmosphere is key to allowing participants to feel comfortable enough to openly share their feedback with us.

Backstage service provider activity layer

Before testing researchers re-designed and then prototyped an intervention application for testing BC strategies to make this application useable for older adult users through a co-design process. Researchers used a custom developed research dashboard for real-time insight into incoming participant data, figure 2, E. Time was set aside by members of the research team to check the incoming data and reach out to participants who seemed not to be transmitting data regularly. In addition, there was an on-call researcher who participants could call or email if they had questions about the study or use of any of the technologies provided by the research team. If, during these monitoring sessions, we noticed that there was little or no data coming in from a particular participant that participant would be contacted by phone. Usually, any problems could be solved by trouble shooting over the phone but sometimes an in-person meeting was planned to assist participants. This real-time monitoring was instrumental in preventing data loss as many participants needed to be called and helped with relatively simple things such as re-opening the background applications which transmit the physical activity data collection.

Support processes layer

A background application collected data from the wearable activity tracker in real-time and stored it on a protected server at the Eindhoven University of Technology. Other data from questionnaires provided to the participants was also kept on this protected server, allowing the research dashboard to generate visualization by drawing information from both data sets. The analysis of this data is still ongoing and will be the subject matter of a different paper. In this paper however, we can recommend the use of software which allows researchers to integrate data of different kinds, such as open access weather information, questionnaire data, measured activity data etc. This insight into on-going data collection can be especially valuable to gain insight into the dynamic process of BC in a living lab.

Analysis

From the use of the PSS described above we can draw some early conclusions about how taking a PSS approach to a living lab investigation increases older adult engagement in important in-context research about BC toward a more active lifestyle. This promising increase in engagement is evident in how this study supported technology acceptance, this study's low dropout rate and anecdotes collected by the research team.

In order to support participation, it was necessary to address the barriers to technology acceptance older adults face. In order to do so, the PSS described above, initially called for a co-design session to re-design the intervention application and provided means of on-going technology support. Throughout this investigation, participant's self-reported confidence with mobile smart phone technology improved. Of the 48 participants who responded to this item on all questionnaires, 18.6% responded that they felt "very confident" about smart phone use to the onboarding questionnaire, while by the debriefing session this percentage had risen to 30.6%.

In addition to the increase in self-reported confidence about technology use, participants showed engagement through their use of the intervention technology presented during this research. Out of the 58 people who participated in this investigation 55 used the messaging (in the social reflection application) or personal log (in the self-reflection application) functions to send messages. Overall a total of 896 messages were sent over the 5 weeks in which the intervention applications were deployed.

Supporting technology acceptance and confidence in smart-phone-use in our method, seemed to lead to increased engagement as we enjoyed a relatively low participant dropout rate during this 9-week study. In this study, the participant drop-out rate from on-boarding till the de-brief session was 11.5%. Other sources describing physical activity promoting research studies with older adults cite drop-out rate between 6 - 36% (Schmidt, Gruman, King, & Wolfson, 2000). Though some drop out do to unforeseen or medical reasons in nearly unavoidable, this relatively low participant dropout rate and the overall willingness of participants to continue to participants in the study points to a relatively high level of participant engagement.

Throughout this investigation, participants made ample use of the 'on-call' technology support our team provided. To the researchers this illustrated that participants were concerned with making sure all their devices worked. Participants who reached out for technology support wanted help so they would be able to use the intervention application again. One participant who was unable to fix their problem with guidance over the phone, immediately came over to the university for an in-person meeting, because they did not want to make an appointment and wait to meet the researchers at the senior community center. This showed great motivation to want to take part in the study. At the end of the trial some participants asked if they could download the application and if the hardware was for sale, indicating an interest for continued use. Some participants mentioned talking about their physical activity information displayed in the intervention application and on at least one occasion, participants arranged to meet each other outside of the planned workshops, specially to look at the application together. In this case one participant who was more experienced with technology, took the time to explain it to another participant how the provided mobile devices worked. This anecdotal evidence combined with this study's low participant dropout rate and the indication toward increased technology acceptance, suggest that participants felt engaged in the living lab research about BC strategies.

Discussion and Reflections

Our living lab research study addresses all of the concerns Hopfgartner et al. mention in their "Benchmarking News Recommendations in a Living Lab", through our implementation of the PSS. Hopfgartner et al., support living labs as a good approach to the evaluation of a product or service, while we use the living lab as a test bed to investigate BC strategies and to develop technologies potential. A living lab is a valuable method however, it is not adequate to overcome the barriers to technology, nor address the needs of older adults with limited technology acceptance.

Though previous work has shown the merits of co-design, living labs, and even presented guidelines for research with older adults, rarely have these domains converged as we propose here. While Liedtke et al. advocate a living lab approach to test product services systems (Liedtke et al., 2015) we advocate a product service system approach to enable living lab research to test BC strategies. Davidson and Jensen, 2013, provide an example of how we can co-design digital interfaces with older adults, yet did not report on developing the proposed ideas into working applications and then testing them in a living lab setting. In their suggestion for future work, they suggest taking the experiment further to the development of the applications (Davidson & Jensen, 2013), as our PSS approach has allowed us to do here. Implementing the above-described PSS approach to the setup of living lab design research can provide the necessary support to older adult participants, by providing means of on-going engagement.

The benefit of our PSS is that it has allowed our research team to consider the user experience of being a participant in living lab research. In the past, the use of PSS have been limited to either user testing a PSS (Liedtke et al., 2015) or describing PSS development methodology for business (MOON, OH, KIM, & HWANG, 2013). Here we advocate for the use of PSS approach to design research.

While our research is still on-going, our reflections on this work so far have yielded guidelines we would like to share:

1) Use a Product Service System approach to set up living lab research
2) Foster relationships to build a living lab community
3) Communicate intentions and expectations ahead of time
4) Co-design necessary interfaces and interventions
5) Show appreciation for their contribution
6) Use best practice policies to ensure privacy and data security
7) Offer tech support
8) Take your time: allow time for questions and for people to get used to the new technologies
9) Facilitate continuous data monitoring
10) Share your findings

Though the preliminary evidence presented here is not conclusive, using the product service approach to create living lab environments for in-context behavior change research shows promise to increase engagement, as indicated by the relatively low participant dropouts and potential to overcome, at least in part, barriers to technology, as demonstrated by this increase in confidence with mobile devices.

Conclusion

In this paper, we describe the PSS we created to overcome barriers older adults face to participating in living lab research for behavior change. A PSS approach to design research allows us to build on the knowledge from many different research domains which has clear benefits for the research team and participants alike. The PSS we designed enables researchers to engage older adults in living lab research about how technology can support behavior change towards a more active lifestyle, by delivering on-going support to the participants beyond the workshop moments and throughout the several weeks of the study. In our PSS concept, detailed in figure 2, we built on existing guidelines for engaging older adults in research. Like Harrington et al. 2018, we made sure to provide users with relatively limited experience with mobile technologies time to use and get used to the new devices (Harrington et al., 2018). We continued to build a close working relationship with the older adult organization where we conducted our living lab study, in line with the guidelines provided by Eisma et al. (2004) (Eisma et al., 2004). Marin-Hammond et al. (2018) also suggests working with relevant organizations to recruit participants (Martin-Hammond, Vemireddy, & Rao, 2018). The service provider is an important partner and expert in facilitating this necessary living lab research. Therefore, we would like to encourage other design researchers to follow up the PSS idea by teaming up with expertise outside design field to engage and empower older adults to contribute to behavior change research in living labs.

The purpose of this paper is to share our reflections on our process to provide inspiration to other practitioners who aim to conduct related studies. With this contribution we hope to build a more inclusive research environment to include members of more difficult to access communities toward a better understanding of behavior change strategies.

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Building an Age-friendly City for Elderly Citizens through Co-designing an Urban Walkable Scenario

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This paper is based on the research project – "*LONGEVICITY*" - carried out in the Metropolitan Area of Milan, which looks at the cities of the future as highly populated by long-living active people and innovative technological facilities. The project is conducted by a multidisciplinary research approach to study how to support social inclusion of elderlies' living in urban environments by enhancing their active walking. The whole process will engage participants (senior citizens) and stakeholders in a human-centred design approach. In this paper we will present the results from the preliminary research activities carried out: case studies and territorial observations. The first activity was oriented to investigate and select innovative solutions to enhance the mobility of elderly pedestrians and to improve their (social) lives. The second one helped us in better framing the design context of action and assessing at, a microscopic level, the degree of walkability of specific territorial areas.

Keywords: Age-friendly city, Walkability, Social inclusion, Human-centred design

Introduction

Population ageing is one of the most significant global trends of the present times (UNWTO, 2017): older adults comprise the fastest growing segment of the population (i.e. ageing society). According to a recent forecast (WPA, 2015) by 2025 the number of people aged 65 and over will represents the 20% of the population in most of the OECD Members Countries. In particular, Italy and Japan hold the world record for longevity of the population, due to the decline of birth rate and the increase of life expectancy. This trend is even more relevant considering that by 2025 the 59% of the global population will live in cities and urban agglomerates. It's definitely necessary to take elderly into consideration of building future cities, where all citizens will be inclusively cared, supported and even empowered. This is especially crucial for managing and planning of urban environments.

"Walkability" is an idea that is increasingly popular for "smart growth" and sustainability in the city. (Glicksman,Ring, Kleban, & Hoffman, 2013). Research has tied measures of Walkability to health outcomes such as reduced obesity (Brown, et. al., 2009), lower rates of depressive symptoms (Berke, Gottlieb, Oudon, Vernez, & Larson, 2007), and even greater longevity (Tkano, Nakamura, & Watanabe, 2002). And "walkability" is also becoming an important concept in the field of ageing, especially among advocates for programs that encourage active aging and helping older adults remain in their homes and communities.

This research, founded by a national foundation for three years, is conducted by a multi-disciplinary research team: 1) information, system and communication research team, 2) design research team, 3) the regional volunteer association for the elderly and 4) advanced science and technology research team. In this research,

the authors address the question of how to facilitate the urban neighbourhood to be more walkable for senior citizens in a specific European city. The research project aims at better understanding what elderly people perceive as criticalities or valuable elements while walking/crossing in the city and at improving the situation by means of practical interventions on the comfort, safety and attractiveness of urban environments. This study will focus on the co-creation of urban spaces, which will act as a "social centre" of the neighbourhoods that increase the possibility and the willingness of elderly citizens to participate in social activities and have social interactions. Existing checklists and guidelines for the design of age-friendly cities do not often take into account the needs of sociality among the elderly, which is instead the truly intrinsic motivation for them to navigate the city. The investigation of innovative design solutions for the outdoor urban areas will foster the walkability and accessibility of the environments, more significantly, will induce spontaneous aggregation and appropriation of public spaces by elderly citizens. This will be promoted by conducting a human-centred approach for creating new meaning of age-friendly cities. The results of the project will provide knowledge, data and experiences useful for city managers and policy makers involved in the design of innovative and technological solutions (ICT, IoT) for the management of mobility in future smart and sustainable cities, characterized by the presence of active long-living inhabitants interacting with multiple technology-based services.

Methodology

Based on the research questions identified in the previous part, the research strategy for the whole project is explained below.

Cross-disciplinary methodology: the proposed methodology is based on the integration between quantitative data collection techniques and qualitative co-design methods. On one side, there is a combination between collecting data of pedestrian locomotion behaviour (i.e. analysis) and the power of computer-based pedestrian simulations (i.e. synthesis). On the other side, a human-centred approach guides different actors to collectively participate in the whole research process. The results obtained from the representational observation and the experimental investigation of pedestrian behaviour give the basis for the following co-design phase, validation of computer-based simulation systems, testing the adherence of the simulation results on realistic behavioural dynamics. A GIS-based territorial analysis identified those areas in the city of Milan that are characterized by the highest presence of elderly inhabitants and by the poorest level of pedestrian safety. These areas will be exploited as "living labs". Outdoor and indoor activities involving a large sample of senior citizens will be undertaken to foster their mobility and inclusive sociality. Senior participants will also be engaged in participatory design laboratories to express their needs and desires. A series of empirical studies will allow to: 1) assess the degree of walkability by means of questionnaires; 2) study age-driven walking and road crossing behaviours by means of observations and experiments; 3) testing and prototyping initial co-design solutions. The results of the project will provide first-hand feedbacks, ideas and proposals for the design policy and guidelines for the management of age-friendly pedestrian mobility in future cities.

Under the general defined methodology, the design research team specified the research strategy and activities based on its interests and its role in this project. In order to build a basis to start this research project, literature review was conducted to create framework and criteria for data collection activities. Case study, onsite observation and interview were organised to collect both first-hand and second-hand research data for shaping promising and situated design opportunities. After defining the design challenges, focus groups and participatory laboratories will be carried out to generate and test new solutions (new product, spatial and service ideas). The whole design research process has been illustrated below (figure 1).
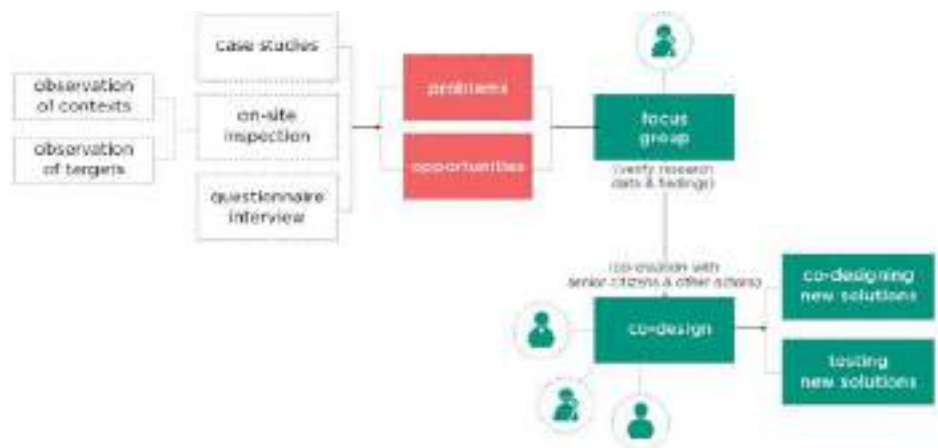
Figure 1: Research process of design research team in this project. Illustrated by authors.

Literature review

The literature review activity has been addressed to three main topics: age-friendly city, definition of walkability for elderly and collaborative design approach.

Developing age-friendly city

WHO (2002) stressed that the notion of 'active' refers to the idea that older people should be able to continue to participate in social, cultural, spiritual, economic and civic fields and issues. Then in 2007, the concept of "Age-friendly City" (WHO, 2007) was introduced: a framework for urban development encouraging Active Ageing, the promotion of physical activity of ageing people recognized as a priority for public health actions. Many countries responded through the development of policies and interventions supporting physical activity as a key challenge for future actions and calls to support vulnerable population groups, encouraging the active inclusion/participation of people in urban areas. An age-friendly city is a city that "encourages active ageing by optimizing opportunities for health, participation and security in order to enhance quality of life as people age. In practical terms, an age-friendly city adapts its structures and services to be accessible to and inclusive of older people with varying needs and capacities" (WHO, 2007). An age-friendly city: 1) recognizes the great diversity among older persons, 2) promotes their inclusion and contribution in all areas of community life, 3) respects their decisions and lifestyle choices, and 4) anticipates and flexibly responds to aging-related needs and preferences. Making age-friendly cities is one of the most effective instruments to respond to demographic ageing, enabling people to actively live the urban environment while the cities themselves will benefit from people involvement and well-being.

There are mainly two aspects to consider when developing an age-friendly city. Firstly, the physical environments, the city's infrastructures, have significant impacts upon the elderly citizens. Older people might be especially sensitive to the change of built and physical environments. For example, some urban development models have focused more on physical infrastructure and design (Atlanta Regional Commission, 2009) for the elderly, and the safety of older pedestrians is identified as a major issue in many cities (Buffel et al, 2012). WHO released a checklist of essential features of age-friendly cities (2007) to guide policy makers, public institutions, groups and even individuals to make their cities more age-friendly. The checklist mainly includes the following aspects: for example, the outdoor space and buildings are set as one of the principle elements to consider and control for designing cities to be more age-friendly. There are different ways in which urban environments might be accessible and satisfying for older citizens: models are emphasizing on the physical/social environment and also on from top-down to bottom-up governance. Other models focus on physical infrastructure and design (Atlanta Regional Commission, 2009), while some else (e.g. the UK model of Lifetime Neighbourhoods) pay more attention towards social aspects of the environment. Physical accessibility, proximity, security, affordability, and inclusiveness appeared as important characteristics in all locations for developing age-friendly cities (Plouffe & Kalache, 2010). Buffel et al. (2012) has also stated other main issues as challenging for developing age-friendly cities: the safety of older pedestrians, rates of crime and environmental changes. Besides, he suggested to treat the resources associated with urban communities and networks generated in the neighbourhood as opportunities.

Secondly, the software of the city, e.g. offered services, relationships and networks relevant to specific contexts, is equally important to transform a city to be age-friendly. Hirsch et al. (2000) identified two major factors affecting the quality of life of an elder individual: independence (the capacity to care for oneself making one's own decisions) and engagement (the possibility to communicate and share experience and friendship). Research on age-friendly city also investigated the quality of social relations that promote social participation (Lui, Everingham, Warburton, Cuthill, & Bartlett, 2009; Scharlach, 2012). Some have studied the formal and informal relationships, participation and inclusion (Department for Communities and Local Government, 2008). The relationships between elderly citizens and cities could be positively leveraged through forming a lively and dynamic age-friendly community. Social participation is strongly associated with physical and psychological well- being, in older life as during the entire lifetime; it refers to people's interaction and engagement with other people within a society, whether it is a defined association of people or the neighbourhood in a city. Activities such as working, volunteering, engaging in recreational activities and living with the community, is the heart of social participation. Sense of belonging and trust on people and places enforce social networks and spring new ties.

During the 1990s and early 2000s, WHO introduced the concept of "Active Ageing": the word "active" refers to "continuing participating in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labour force", having as a final and highest goal to "extend healthy life expectancy and quality of life for all people as they age" (WHO, 2002). Mobility and accessibility are also key factors in the discourse of Active Ageing as they presume the capacity to move independently and safely from one place to another. From another perspective, Active Aging also promotes the recognition that older adults are not just the beneficiaries of age-friendly communities: they also have a key role to play in defining and shaping their distinctive features (Menec, Means, Keating, Parkhurst, & Eales, 2011; Buffel, 2015). The development of age-friendly city should involve elderly citizens in actively reforming, together with other actors, the city for all citizens.

Walkability assessment for senior citizens

The attention around the issue of walking in the city grew considerably at the end of the '80s. Designers and urban planners focused on strategies for the development of pedestrian areas and, in general, on promoting walking in urban territories. The European Charter of Pedestrian Rights (1988) highlighted the need to ensure the comfort and safety of pedestrians in urban areas, including the elderlies and people with impaired mobility:

- Art. I - "The pedestrian has the right to live in a healthy environment and freely to enjoy the amenities offered by public areas under conditions that adequately safeguard his physical and psychological well-being"
- Art. III - "Children, the elderly and the disabled have the right to expect towns to be places of easy social contact and not places that aggravate their inherent weakness"

Jeff Speck (2013) has recently defined a general theory of Walkability, which explains how, in order to be favoured, a walk has to satisfy four main condition: it must be *useful*, *safe*, *comfortable* and *interesting*. As stated in "Proposed Walkability Strategy" by Stantec Consulting Ltd. (2009), "walkability is the measure of the overall walking and living conditions in an area and is defined as the extent to which the built environment is friendly to the presence of people walking, living, shopping, visiting, enjoying, or spending time in an area". Reid Ewing (2009) defined three characteristics for a pedestrian-friendly environment:

- Essential features: Urban density, mixed use of the territory, relatively small neighbourhoods, safe and recurring pedestrian crossing (every 150 meters), continuous sidewalks wide enough for dyads, separate walkaways from vehicles-dedicated lanes.
- Highly desirable features: Proximity to commercial activities and green areas, harmony of big and small buildings in the same area, right proportion of space dedicated to the vehicle traffic and pedestrian flow.
- Nice additional features: Street and public space furniture such as benches, effective signals and urban elements aiming at enriching urban decor and cultural features.

Improving mobility implies barrier-free buildings, streets maintenance, perceived safety and, in general, making secure for children to play, for women to venture outside and for elderly to find place in outdoor activities. The whole community would benefit from an age-friendly environment and, in particular, from the

participation of its older members. An age-friendly city is also a city able to develop a "walkable community" (Jacobs, 2011), that is, to design a human scale environment where safety is promoted, and people can enjoy walking and gathering in comfort.

Starting from the general theory of walkability proposed by Speck (2013), this research redefined a set of walkability assessment criteria specifically focussed on the needs of senior citizens who walk in urban neighbourhoods. As explained in the previous part, senior citizens have more sensitive feelings about urban environments and infrastructures. According to this preliminary consideration, below a set of walkability indicators for the evaluation of the level friendliness of urban areas for senior citizens is proposed and explained:

- **Usefulness**: the urban environment should be designed and planned with an adequate level of land-use mix, street connectivity and commercial density, to guarantee the presence of numerous and diverse public services and facilities within a walkable distance (e.g. public transport services, residential facilities, commercial activities).
- **Comfort**: urban infrastructures should be designed according to a series of standard criteria of quality and accessibility which accommodate the needs of all pedestrians, especially the senior citizens (e.g. pavement type and continuity on sidewalks, installation of ramps for people with reduced mobility, adequate width of sidewalks to avoid crowds in rush hours), but also according to a set of highly recommended elements which support the comfort while walking (e.g. installation of dedicated urban furniture for resting for the elderly, such as green areas with trees, benches, tables and fountain; installation of waste baskets for separate collection of rubbish to maintain the cleanliness of the city; typologies of public spaces, e.g. playground to meet others) (Gorrini & Bertini, 2018).
- **Safety**: urban environment should be planned to assure the safety of senior citizens while walking and crossing the roads (e.g. absence of barriers, obstacles and pothole on side-walks to avoid the occurrence of injuries; proper design of road intersection layouts to avoid pedestrian-car accidents; installation of speed bumpers to reduce the speed of vehicles; installation of traffic light and illumination systems at intersections to guarantee visibility of pedestrians while crossing; specific crossing aids to support senior citizens). This is most crucial element when evaluating the walkability for the elderly.
- **Attractiveness**: the city should be designed to have with several and distinctive areas of attraction to promoting walking activities; this is based on the presence of points of interest and events, the quality of the architectural appearances (e.g. enclosure, amenities, public spaces, green areas) and the vitality of the social context. Also, the emotional aspects (e.g. hearing and smell) should be considered as a part of attractiveness.
- **Legibility**: streets should be designed to support way-finding activities. Most senior citizens are familiar with the neighbourhood where they are walking, however, the urban environment should be designed to be legible, interpretable, memorable, or navigable by itself considering its architectural and infrastructure features (Gorrini & Bertini, 2018).

The proposed criteria represent a general guideline towards the design of age-friendly urban environments. To be successfully used as supports to city managers' activities, every specific item should be listed in a better organised protocol for further steps. According to Pearce (1985) and Blečić et al (2016): socio-demographic characteristics in terms of age and grouping (e.g. the decline of motor abilities linked to ageing make elderly people walking slower than adults); the purposes and frequency of walking (e.g. the walking behaviour of senior citizens for leisure is different from those with specific task to complete).

Design shapes a new meaning of "elderly"

Design, as a discipline, is increasingly crucial to play an irreplaceable role in understanding complex social issues and solving social problems. When Papanek (1972) firstly mentioned the importance for designers, architects and city planners, to consider the social and environmental impacts of products and raised the concept of humanitarian design movements, which emerged over during the following decades. Looking at the social impacts of most products, which do not take ageing and its peculiarities into consideration or simply avoid the consciousness of getting old. The products are well designed with a beautiful appearance, but they don't consider the seniors' needs and behaviour habits. Often in the world of products, as well as marketing, it does not seem to notice the availability and predisposition for consumption of the seniors. When there is attention to the problems (physical, cognitive, psychological, emotional) of the elderly, the creation of

artefacts is often excessively stigmatizing. The products that respond to a specific function, almost a mechanical translation without any attention to the aesthetic and emotional aspects, the user-friendly interaction and the right meanings. The problem is that a certain type of design (but also a certain approach of marketing) forgets that an artefact must, above all, be able to transfer meanings and emotions, not only the function.

The concept of involving design discipline and methods in this research is naturally linked to some significant design issues: design for all (EIDD, 2004), universal design (Mace, 1996) and inclusive design (Myerson & Lee, 2010; Clarkson et al, 2013; Shipley, 2014). Especially, when design solutions should be applied for a wider range of users (e.g. in urban public spaces), the design principles and guidelines need to guarantee the equality of different types of users and targets. This is the basis of designing for an age-friendly city. From another perspective, there's the so-called "hospitalization approach" which is constituted by very stigmatising products and services, usually characterized by little attention paid to attractiveness. Design, in this situation, could and should not forget a design solution (product, service or spatial design) has to transfer a new meaning to users and consumers (Verganti, 2009). Therefore, an attention to the senior users with meaningful product, spatial and service solutions should be payed when designing for them. Attractiveness and usefulness are two equally significant aspects to consider. In a Human-Centred Design process (Norman and Draper, 1986; Norman 1988), a design activity have to start from gathering a better understanding of senior users' needs. This approach has its origin in ethnography and participant observation methods: the user should be put at the centre of the observation and designers could get important insights derived from the identification of customer needs in order to generate innovative products (Zurlo, Sedini & Vignati, 2015). However, human-centred design approach alone doesn't work effectively to read and tell behaviours, actions, interactions and relations. Designers should be able to reveal the hidden needs, interpret and transform them into new solutions, which provide more than what users think and feel they want.

Jacobs (1961) has stated that cities have the capability of providing something for everybody, only because, and only when, they are created by everybody. This idea claimed the importance of involving citizens in a co-think and co-doing process of creating a city for all. In this research, in order to shape an age-friendly space for elderly to walk, it's necessary to engage senior citizens in the whole design process. Designers are facilitators to bring the voices of the elderly and to create a condition in which they could participate in discussing and decision-making processes. The design process is a creative conversation, in which different actors are going to negotiate on ideas, strategies and implementation as well. Another element to highlight is that the design process doesn't end up with ideas on the paper with well-illustrated graphics. The advantages of involving senior citizens in a co-creation process lies also in prototyping the initial solutions and getting feedbacks in order to make adjustment quickly and effectively. However, the balance between listening to final users and making interpretations should be controlled by designers. Radical innovation comes through meaning change and, as we already stressed, design for seniors must, first of all, change its approach to its meaning and contents (Verganti, 2009).

Case study

The literature review has helped to create the research boundary and focus. Afterwards, the case study phase collected international inspiring cases useful also for the following ideation phase.

Case collection

The case collection activity started from the three key topics identified in the literature review phase, and mainly four categories/main areas have been selected to guide this step:

- New concept of urban living for elderly (with a focus on "mobility")
- Smart aids for elderly (with a focus on technologies' impact)
- Active social life (community-based solutions)
- Explorative/visioning solutions (conceptual and experimental projects)

The firs category is focused on finding solutions (products and services) providing new concepts of urban living for senior citizens. In this direction, mobility is a highly relevant issue to consider. The second category looks at solutions that are enabled by applying specific technology to answer to specific needs of senior citizens. The technology, especially digital technology, has been playing more active role in the lives of the elderly. The third group of cases includes solutions that involve senior citizens to actively participate in social life within their

communities or interact with other communities (e.g. Millennial or children). The last category has the interest to search for provocative and critical cases which reflect on thoughts and ideas that have been taken for granted about aging and elderly.

Case analysis

Finally, 31 international cases were collected and analysed. According to the research objectives and previous literature review, the primary case analysis activity was conducted to understand the scenario context and the role of senior citizens. Different cases proposed quite different scenarios, in which solutions have been provided to senior citizens. Some of them are contextualised in specific spaces, other solutions could be adapted to different spaces, from indoor to outdoor contexts. For instance, adaptability is shown in the case "crosswalk[1]", an App for senior citizens to digitally interact with traffic lights to assure the safety of walking and crossing in public spaces; this case is proposing a solution to reshape city infrastructures "strategically" according to senior citizens' needs.

Another aspect we looked for, in all the cases, is how senior citizens have been "designed" to respond to the solutions. We found two different models among all the cases: some of them are "enabling solutions", others are "relieving solutions". For example, the case "ShineSenior[2]" from Singapore, enables elderly Singaporeans to age-in-place, whereby the elderly can stay within the comfort of their homes and familiarity of their neighbourhoods. This service about sensor-equipped home enables the elderly to live independently and have the possibility to take more social actions and even take care of other seniors in the community; they could be both the service receivers and service givers. Therefore, this case presents the idea about how the solution could enable and support a more independent and community-based life for seniors. Another case we have analysed called "responsive street furniture[3]": uses digital technology to make streets work better for people (the elderly included) who find moving around difficult for several reasons. The solution has been designed to help the users completing their way-finding tasks. Thanks to the technology, senior users have been relieved and fully guided and assisted. The result of mapping all the 31 cases in the matrix is presented below (figure 2).
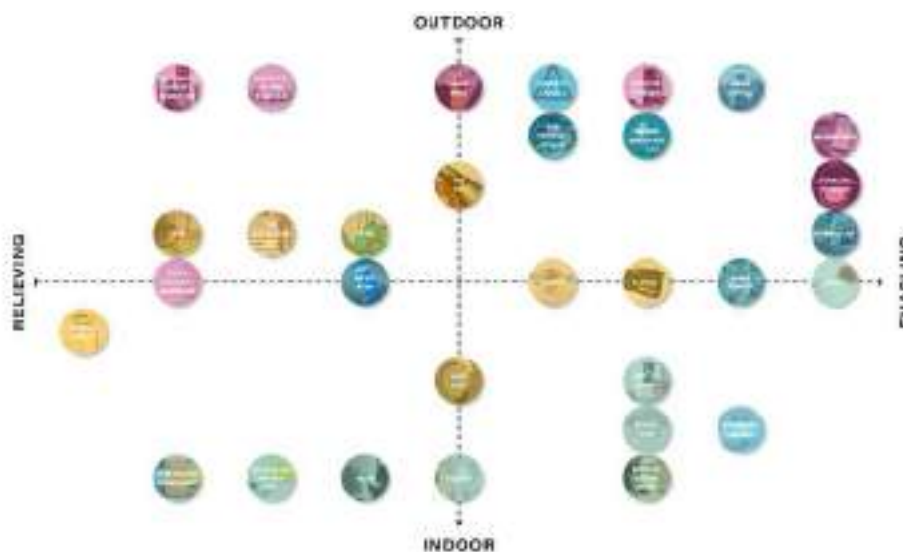
Figure 2: Case study matrix. Illustrated by authors.

Onsite observation

A series of onsite inspections were carried out as a microscopic territorial analysis of the areas identified by the previous GIS analysis in two selected and specific neighbourhoods (one in an urban area, one in a suburban

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[1] http://www.yankodesign.com/tag/eldudy/CROSSWALK2017

[2] https://icity.smu.edu.sg/shinesenior-home

[3] http://www.rossatkin.com/wp/?portfolio=responsive-street-furniture#WALKABILTY

area). The selection process considered a series of indicators (e.g., quality of sidewalks, safety of crosswalks, presence of public services), and this selection was decided together with all the partners.

Designing observation protocol

Based on the walkability framework for elderly identified from literature review, the research team developed a protocol for conducting onsite observations in selected neighbourhoods. The observation protocol includes six main indicators: usefulness, comfort, safety, attractiveness, legibility and population. The first five elements have been explained in detail in the previous part. The last indicator: population, has been added in the protocol with the consideration of getting comprehensive picture about the observed area. During the observation process, researchers paid attention not only on the hardware: urban infrastructure, but also on the software: typology of people, who are living and carrying out their daily activities in that neighbourhood, etc. For each element, specific questions were designed to get sufficient data for producing a walkability assessment. Each question has generally four levels: low, medium, high and excellent.

The areas to observe were selected starting from the service centre for elderly located in that area as the main central point of interest. There is higher density of senior citizens who are walking in those areas. Moreover, the protocol is highly standardized in order to register neutral-enough results without personal preferences.

Conducting walkability assessment

Two researchers conducted the on-site observations. They went to the first selected area about 7 times and conducted the observations both during the day (in the morning or in the early afternoon) and during the late afternoon (around 16:30 to 18:00). In winter during these hours the sun goes down, therefore, it's the right period to observe the effectiveness of the lighting system. Data were collected thanks to the implementation of a shared online protocol. The choice of using a digital online tool was due to the possibility to standardize the observation process and give the researchers a common tool. In addition to that, this tool allowed to easily analyse and compare data. We carried out 15 observations. The data were analysed using excel and assigning scores for each elements according to their presence or absence. In this research, the walkability assessment formula has been designed as: Walkability =Usefulness (20%) + Comfort (20%) + Safety (30%) + Attractiveness (20%) + Legibility (10%). At the end, we calculated a score for each observation and based on the formula, we generated the final walkability score for each street and then for the whole area of interest.

Results from preliminary research data

Thank to observations, carried out initially in the central area of the city of Sesto San Giovanni, and then in the area of Gorla-via Padova of Milan, we investigated different aspects which concur in the evaluation of walkability. We both analysed the levels of walkability for each street taken into consideration and for the whole area of interest.

We present here only the results from the observations carried out in Sesto San Giovanni (because the observations in Gorla-via Padova were made afterwards). In particular, looking at the general scores of the area:

- Usefulness: registered a medium score (0.32). Indeed, this area offers several important services which are at a walking distance from our main point of interest, such as Post offices, banks, grocery shops, recreational places, etc.
- Comfort: registered a high score (0.52). This area presents pretty good conditions of accessibility especially for elderlies and it is constituted by elements which favour to experience the area by foot. This means, for example, that sidewalks are wide enough and not too steep to be easily walked and that there are not many obstacles which impede the passage of a person. In addition to that, public spaces and urban furniture are generally satisfying in terms of pleasantness and they basically answer people needs to rest and be informed.
- Safety: also this indicator registered a high score (0.57). This indicator is very important in order to favour both the perceived and the actual security in walking around the area both during day and night. It does not refer only to personal security but for example it includes the presence of safe pedestrian crossings.
- Attractiveness: a high score it was registered (0.58). In a different way from the usefulness indicators, attractiveness points out the vocation of an area. A mixed vocation is preferable than a unique one

and our area of interest is indeed mainly both residential and commercial, offering also educational and others' service activities. In addition to that, attractiveness measure also the presence of litter, noise and unpleasant odours, which in our case are all limited to those present in an average but well-maintained urban street.

- Legibility: even if this is the least important indicator, we registered a high score as well (0.64). This means that signs and street indications are readable enough also for people who might have some sight issues.

As the total walkability is concerned, the area registered a high score (0.52). This is an important result to evaluate also the possibility for us to easily conduct the following research activities, such as shadowing of senior citizens who walk in this area, organize outdoor group walking activities with the senior citizens who agree to participate in the project, etc.

Figure 3: The visualised result of walkability assessment through onsite observation. Illustrated by authors.

As explained in the methodology, from the case studies selection and observations, it was possible to identify different scenarios that are going to drive our future steps of research. In particular, we are going to focus on the square "outdoor-enabling" of our matrix. Moreover, the research team has also tried to use the five indicators identified from literature review to re-analyse 31 cases collected in the previous step. With the objective of absorbing useful inspirations, the re-analysis process has selected the most relevant cases to generate direct insights for next phases. Regarding to "*usefulness*", one case has presented a new service typology of community-living for elderly. A case about responsive urban furniture provides ideas about how an open space could be transformed by technology to provide useful information for citizens, especially those have limited accesses. This is a way to increase the "*comfort*" level. Besides, a number of product design have offered solutions to elderly people to ensure the "*safety*" of daily activities and to encourage their active walking. For example, a pair of shoes have been designed to prevent elderly falling down while walking. Regarding to "attractiveness", one case has shown the possibility to change a neighbourhood through artistic intervention to retell the historic stories relevant to elderly citizens.

In addition to that, next steps of field research, which has been already planned, will consider a new field of observation in a more critical area of the city of Milan in terms of walkability (Gorla-via Padova). As in the case of Sesto San Giovanni' observations, we are going to collaborate with another centre of support for elderlies. Starting from the centre, which constitutes our point of interest, a surrounding area of observation has been identified. This second phase will be used to assess and refine the observation protocol. Moreover, these primary results will be also evaluated according to:

1. A series of qualitative interviews with senior citizens;
2. The design-orienting scenarios identified.

The first activity (interviews) will be oriented to the assessment of walkability' indicators since the perception of our target might be different (better or worst) from what we actually observed. In addition to that, we are going to gather information about different levels of social inclusions thanks to questions about their daily life. The second activity will be oriented to identify and develop design solutions able to address and eventually solve walkability issues. Indeed, the exploratory research phase (case studies) will be interpreted in accordance with observations and interviews results in order to select even more specific areas of interest. The following phase will expect the conduction of co-design activities where the senior citizens will be involved in order to design a more walkable and therefore inclusive neighbourhoods.

Acknowledgement

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Track 1.b Introduction: Re-Designing Health: Transforming Systems, Practices and Care

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The *Re-Designing Health: Transforming Systems, Practices and Care* track explores the increasing role and possibility for a wide range of design practices and methods to contribute to health care products, provision, and systems.

There is growing recognition of the increasing complexity faced by healthcare systems; critical issues and challenges include ageing populations, chronic diseases, growing drug ineffectiveness, and lack of access to comprehensive services (to name only a few examples). Concurrently design thinking, methods and practices are increasingly recognized as means of addressing complex, multi-levelled and systemic problems.

The track session brought together design academics, researchers and practitioners that are working in—and across—areas of design, medicine and health. Employing design methods, practices, and thinking to address a range of healthcare challenges—from individual product to large-scale policy. This track provided a forum for researchers, practitioners, students, and designers to provide evidence for these relationships, document challenges and successes and to provide theoretical and practical models for healthcare and design to work collaboratively to address complex healthcare problems.

We looked to identify and build research capacity to help address the complex and significant challenges faced by society in the 21st century and to chart new opportunities for the discipline of design.

This *Re-Designing Health: Transforming Systems, Practices and Care* track contains six papers that deal broadly with notions of design and health and document a variety of practices, proposals and ideas.

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Re-Designing Health: Transforming Systems, Practices and Care Track Chairs

> Aidan Rowe, University of Alberta, Canada

> Claudine Jaenichen, Chapman University, USA

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In our first paper, *Reframing Healthcare: Emerging Health Design Opportunities,* design researchers, Aidan Rowe and Michelle Knox, explore the possibilities that design offers—methods, practices and processes—to help address the identified rising complications related to contemporary healthcare provision.

While design and health have a long history of working together, much of this work has been limited. In this paper, the authors make the case for further opportunities for design and health to work together in deep, meaningful and human ways.

They begin by discussing the changing space of design, then articulate the similarities between design and healthcare. The authors then present two health design research projects that employ design methods and processes within healthcare settings, exploring new opportunities for design and health to collaborate. They conclude by summarizing the benefits and challenges of these projects, articulating future possibilities for design and healthcare to collaborate.

In the track's second contribution—*Aesthetic Considerations in the Ortho-Prosthetic Design Process*—Yan Luximon, Parth Shah, and Hassan Iftikhar explore the role and possibility of applying design to the existing functional process of prosthetic creation.

They note that medical products, including prosthetics and orthotics, are designed to partially or completely assist or replace the functionality of specific body parts affected by ailments or medical deformities. People using such devices share similar sensibilities and concerns, such as looking attractive or being able to wear fashionable clothing. However, due to a greater emphasis on function over fashion in designing these medical products, the aesthetic values of the user are not fully considered. This aesthetic paucity may have a strong psychological and cognitive impact, which affects the user experience. Hence, this study aims to explore key parameters affecting the aesthetics of medical products such as prosthetics and orthotics and identify the challenges involved in their design process. Recommendations have also been suggested for the designers with the help of a design example.

Looking at a framework level researchers Jessica Lea Dunn, Keum Hee Kimmi Ko, David Lahoud, Erez Nusem, Karla Straker, and Cara Wrigley explore design innovation and medical devices in *Exploring the Role of Design in the Context of Medical Device Innovation.*

In this third paper the authors recognize that technology is the leading driving force in healthcare and medical device design, however, innovations which emerge from these practices are often driven by clinical requirements. Such innovations are focused on developing products that address current health issues, diseases or medical problems — often lacking consideration of the end-users' needs.

Design innovation advocates that user-centred design happens much earlier in the product development process so that the patient needs are prioritised. However, this emerging field is yet to be defined and explored in a medical context. This paper, therefore, proposes a framework of Medical Device Design Innovation to explore the role of design in medical device innovation through two medical device case studies. The proposed framework suggests a way to navigate the nuances and complexities of the medical device industry in order to put the patient first while ensuring commercial viability.

In *A Collaboration of University and Civil Society Organisation: Development of a Web-Based Platform for Promoting Accessibility in Design* authors Abdusselam Selami Cifter, Ramazan Bas, and Sema Ergonul explore the intersection of inclusive design, collaboration and design.

They state that accessibility is a fundamental element and a basic requirement of our daily lives; however, in many cases, we are not aware of it unless we encounter its absence. Particularly people with disabilities regularly experience accessibility problems in various domains, wherein certain cases these problems even hinder them from accessing their basic needs.

Designers have an important responsibility to design inclusively; however, they need a diverse range of reliable and up-to-date information for this, which also fits with their requirements. This paper presents an example of a collaboration of university-civil society organization within the scope of "I CAN ACCESS" project, which aimed to develop a web-based platform for designers' use in Turkey in an effort to increase their awareness on accessibility and assist them to design inclusively. The paper particularly focuses on the advantages of collaborations between civil society organizations and universities by revealing their specific resources and possibilities.

In the track's fifth paper—*Gaining Patient Experience Insights: An Integrated and Multi-Leveled Framework of Information*—designer researchers Maitane Garcia-Lopez, Ester Val, Ion Iriarte, Raquel Olarte, and Marina Gonzalez-Zubiaurre explore the lived experiences of health care users.

Taking the patient experience as a basis, this paper introduces a theoretical framework, to capture insights leading to new technological healthcare solutions. Targeting a recently diagnosed type 1 diabetes child and her mother (the principal caregiver), the framework showed its potential with effective identification of meaningful insights in a generative session. The framework is based on the patient experience across the continuum of care. It identifies insights from the patient perspective: capturing patients´ emotional and cognitive responses, understanding agents involved in patient experience, uncovering pain moments, identifying their root causes, and/or prioritizing actions for improvement.

The framework deepens understanding of the patient experience by providing an integrated and multi-levelled structure to assist designers to (a) empathize with the patient and the caregiver throughout the continuum of care, (b) understand the interdependencies around the patient and different agents and (c) reveal insights at the interaction level.

In the final paper in our track, *Design As An Agent For Public Policy Innovation*, authors Federico Vaz and Sharon Prendeville explore the intersection of public policy, innovation, design and the rise of policy labs.

Described as units developing public policies in a design-oriented manner, Policy Labs are tasked to innovate to gain in policy effectiveness and efficiency. However, as public policymaking is a context-dependent activity, the way in which these novel organizations operate significantly differs. This study discusses the emergence of design approaches for policy innovation. The purpose is to map how Policy Labs in Europe introduce design approaches at distinct stages of the policymaking cycle.

For this study, 30 organizations in Europe operating at various levels of government were surveyed. Based on the public policymaking process model, it investigates which design methods are Policy Labs deploying to innovate public policies. The study exposed a gap in the awareness of the utilized methods' nature. It also showed that the use of design methods is of less importance than the introduction of design mindsets for public policy innovation, namely 'user-centredness', 'co-creation', and 'exploration'.

The collected papers in our track—*Re-Designing Health: Transforming Systems, Practices and Care*—recognize the power and possibility for design to contribute to 21st-century healthcare products, provision, and systems. From higher-level frameworks to diagrammatizing patient experience to specific case studies of practice, the exciting range of research demonstrated articulates how design is addressing the multifaceted and substantial healthcare challenges faced today.

Reframing Healthcare: Emerging Health Design Opportunities

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Healthcare systems are faced with increasingly complex demands: ageing populations, chronic diseases, growing drug ineffectiveness, and access to comprehensive services are just a few of the challenges we face. Design offers methods, practices and processes to help address these rising complications. While design and health have a long history of working together, much of this work has been limited. In this paper, we make the case for further opportunities for design and health to work together in deep, innovative and human ways. We begin by discussing the transformative space of design, then we articulate the similarities between design and healthcare. We then present two health design research projects that employ design methods and processes within healthcare settings, exploring new opportunities for design and health to collaborate. We conclude by summarizing the benefits and challenges of these projects, articulating future possibilities for design and healthcare to collaborate.

Design for Health, Healthcare Design, Participatory Design, Co-Creation, Design Futures

Introduction

Today's healthcare systems are faced with increasingly complex demands. Aging populations, chronic diseases, growing drug ineffectiveness, and access to comprehensive services are just a few of the challenges we face. In response, governments, health professionals, and the public are rethinking healthcare through new, innovative approaches.

The maker movement is taking on healthcare as providers, patients, and hobbyists hack technology to create new and better health products, education, and systems. Around the globe, social innovation labs are springing up as collaborative spaces for diverse stakeholder groups to rethink 'old ways' of doing things—through dialogue, doing, and making. The general population also feels empowered—and often confused—by access to more and more information concerning healthcare.

Against this backdrop, design is emerging as an important area within the scope of the health professions (Chamberlain & Craig, 2017). More recently, design—as an academic discipline and as a professional field—has continued to expand its practice, with its processes and methods being employed in a range of institutions, scenarios, and organisations to address some of the most complex challenges facing society (Wildevuur, 2017).

Design provides a broad framework of tools, processes, and systems to effect change in the world. Positioning design as an agent of change that takes as its focus the betterment of the human condition aligns design close to—and shares many goals with—medicine, public health and the health humanities.

While design has a long history of working in healthcare, it has often been situated as a service discipline focused on discrete artifacts (e.g. medical tools or devices) positioned at the end of a project (Groeneveld et al, 2019) or concerned with environments (e.g. architecture or interior design) in the abstract or early stages of a project (Noël, 2017). As design researcher Peter Jones (2013) notes "healthcare design does not yet fit into the conventional clinical organization" (p.xv). Moving beyond these traditional roles, this paper discusses the possibilities and opportunities for employing design thinking, methods and processes to enact difference for a 21st century healthcare system. Particularly, it identifies the opportunities for healthcare work in four directions in relation to design for health research: the focus on rich co-design participatory methods; design's positioning as a future-oriented activity; the grounding of design as interdisciplinary practice, and the expanded scope of possibility provided by and through design.

We begin by describing the changing state of design, noting its progression from a field historically based on outputs to one that is moving to focus on outcomes. We then articulate the relationship and similarities between the fields of design and healthcare, identifying shared histories, goals, and practices.

We next describe and contextualize two recent research projects that have been created to align and employ design practices in healthcare settings. These experiments differ deliberately in scale and scope, from the implementation of focused design systems and practices in specific environments to curricular programs that bring together health students through design to address pressing health issues. Research and feedback are presented to better understand the benefits and challenges of these developments and further contextualized in a broader theoretical framework.

We conclude by discussing some of the dominant challenges and complications faced when working across design and healthcare.

As Jones (2013) notes, we need "new ways to learn, think, and work quickly to make sense of the human, system, and organizational problems that co-occur every day in the morass of healthcare" (p.29). We argue that design offers a powerful array of theories, practices, and ways of thinking to address key and pressing healthcare issues of the 21st century.

In the next section, we briefly discuss the changing space of the discipline of design, articulating its move into academia, changes driven by technology, and, its broadening scope of practice.

Situating Contemporary Design Practice

"The philosophers have only interpreted the world, in various ways; the point is to change it." Marx, K. 1845 Theses on Feurbach: XI)

Design has evolved from an artisanal, master and apprentice-based system with a historical focus on materials, outputs and artifacts (AIGA, 2017).

Throughout much of the 20th century, design practice—including design education—has often been classified by the end products created (e.g. fashion design, furniture design) or the processes employed (e.g. graphic designer) (Davis, 2017). Designers have frequently worked in a reactive capacity—waiting for a client and responding to a brief—in local design-manufacture-consume scenarios, where they shared common understandings, vocabularies and histories with clients and consumers. Often operating within rigidly defined roles, designers have frequently been seen as detached experts with a very specific set of skills and knowledge (Rowe, 2014).

Over the last 30 years, various factors have dramatically transformed the conception of design and its possible applications.

In the second half of the 20th century, the arrival of personal computers and design software created new ways of working, with a switch from the industrial model to an individual one (Bennet & Vulpinari, 2011). Design was no longer locally restricted, but became a practice that allowed, encouraged, and flourished with global collaboration. Further technological advancement also created new field specialties—e.g. information visualization, user interface, and interactive experience—where designers expanded the scope of their knowledge and skills beyond conventional roles and focus areas.

In the last decade, design processes, and in particular, design thinking have been recognized as powerful tools in other fields. Disciplines like business, marketing, urban studies, anthropology, and human-computer

interaction have begun to borrow and imbibe habits, ideas, and ethos from design and its related practices (Koskinen & Krogh, 2015).

Today, there is a greater need and opportunity for designers to resist confinement in disciplinary silos and venture beyond the production of artifacts—whether logo, table, or garment—towards the realisation of impactful outcomes (Parker, 2009). This transition from tightly-defined roles, identities, and specialisms is what Ward (2015) has called a "post-disciplinary future" (p.229). While design has always concerned itself in engaging with and working for other fields, designers are now more actively involved in identifying and addressing complex challenges across a variety of disciplines, professions, and organisations (Parker, 2009). In order to do this, designers have maximised their knowledge capacities and broadened "traditional design skills to address social and economic issues" (Burns et al, 2006. p.6).

As design issues grow in complexity and breadth, the designer-centric model is continuing to give way to user-centred models, where deeper value is assigned to engagement with the end users of designed artifacts and experiences (Hecht & Maass, 2008; Bennet & Vulpinari, 2011). Despite the widespread use of user-centred design approaches, design academics Sanders and Stappers (2008) declare these to be inadequate in meeting the complexities and opportunities at hand because "we are no longer simply designing products for users. We are designing for the future experiences of people, communities and cultures who now are connected and informed in ways that were unimaginable even 10 years ago" (p.6). There is a greater push towards the need for design to further place users and society at the center of the process in more rich and authentic forms.

Design has had a long history of working within the realm of healthcare, although often in a more traditional service capacity. For example, architects and interior designers are involved in the planning and construction of healthcare facilities and industrial and visual communication designers work on specific healthcare products (e.g. surgical tools or signage) (Chamberlain & Craig, 2017). The role that design plays in these traditional situations is often brief, disconnected from the full range of participants, and limited in impact (Groeneveld et al, 2019; Chamberlain & Craig, 2017). As Noël (2017) observes, design is moving from this historic approach to "the design of situations where people interact with other people, services, products, environments and communications" (p.S2308)

Overall, the field of design has witnessed profound change. As an interdisciplinary field, it is enriched by processes and philosophies absorbed from other disciplines, fields, and ways of working. Designers have continued to develop the scope and reach of their practice to meet the needs of our diverse and dynamically evolving social world. This realigned focus from design outputs to design outcomes has been framed by Ward (2015) as a move from the "politics of production to the production of politics" (p.227).

Although designers have played an active part in the transformation of the practice, design research, theory, and education has often lagged behind in steering the field towards what it can and should be.

In the next section, we discuss some of the existing commonalities between design and healthcare.

Shared Values: Design's Existing Parallels with Healthcare

Design and healthcare share a variety of practices, applications, and methods. As Jones (2013) notes in his publication, *Design for care: innovating healthcare experience,* the "two fields are similar in many ways" and these parallels are a useful starting point for articulating already existing intersections and similarities (p. viii).

Some of key parallels between design and healthcare include:

Central to each of these fields is their service to other humans, groups, and society as a whole; both are **People-Centred Service Professions**. Both fields are extrinsically focused, and are often framed as disciplines which require interactions with others. As design health researchers Chamberlain and Craig (2017) observe, both fields look to "promote quality of life and wellbeing for individuals who access services" (p.3). The classification of design and healthcare as people-centred and service-oriented disciplines opens up how professionals work in these areas, for example, by identifying possibilities for employing co-design and participatory approaches.

Both fields are also characterized as **Informed Skilled Practices**. As Jones (2013) notes, practitioners of both design and healthcare "learn by doing" (p.viii). Education in both fields has a shared history informed by a master and apprentice model where students are educated by doing and skilled learning is continued through professional practice. Informed Skilled Practice in both design and health education often employs experiential

learning methods where students learn by situating work in real-world environments in and out of the classroom—e.g. internships, practicums, residencies—to create more authentic learning (Potter et al, 2018, pp.8-9)

Evidence and Observation guide the fields of design and healthcare. Both fields produce improved outcomes when they are structured and conducted as rigorous, purposeful and measurable activities. While an evidence-based approach is firmly established and apparent within healthcare, there is a widely perceived need for design to progress further towards "a user-centred, evidence-based, and outcomes-oriented practice, where "the user" is everyone involved" (Noël & Frascara, 2016, p.4).

Both fields are **Interventionist**, that is, they seek to change situations, with the goal of making them better. In this goal, they both reflect Herbert Simon's (1969) higher-level definition of design, in that they intend to "devise courses of action aimed at changing existing situations into preferred ones" (p.130). Additionally, Chamberlain and Craig (2017) note that practitioners in design and health both work to propose interventions that "promote quality of life and wellbeing for individuals who access services" (p.3).

Uncertainty is a key factor in both areas. As both design and healthcare deal specifically with people and their individual histories and contexts, every situation is unique and responses need to be tailored to individuals.

While healthcare has often prioritised treating diseases over healing the whole person—recent transitions in healthcare have centred on "the experiences, values, and quality of life of patients and their participation in care and treatment" (Groeneveld et al, 2019, p.2). This renewed focus on patient experience affirms the place of the individual in uncertain and variable health scenarios.

Design and healthcare are also **Rapidly Changing**. These changes are wide-ranging and driven from both internal (e.g. professional roles and responsibilities, skills shortages, etc.) and external (e.g. shifting government priorities, technological advancements, etc.) pressures. Within design, there has been a move to build on traditional design skills to address more complex and interdisciplinary social, political and health issues (Burns et al, 2006). Healthcare is also navigating new quandaries, including questions concerning patient knowledge and engagement. As Chamberlain and Craig (2017) observe, healthcare is distancing itself from the "reductionist view of health that focuses on illness and treatment is being replaced by one where the emphasis is placed on ways of maintaining wellbeing and equipping individuals with the knowledge and tools to live well" (p.4).

Recent issues around **Democratization** are also central to the fields of design and health. As healthcare begins to reject its highly structured and treatment-focused model in favour of one that informs, supports, and empowers patients in many ways, there are further possibilities for achieving a balance of power and forming reciprocal relationships amongst all participants (Groeneveld et al, 2019). While some areas of design have long been involving users in the design process—through user-centred and participatory design—other areas of design have only recently begun to embrace these co-creation practices that blur the line between expert and user. These shifts in both fields represent a flattening of traditional power relations and produce opportunities for engagement aimed at "maintaining wellbeing and equipping individuals with the knowledge and tools to live well" (Chamberlain & Craig, 2017, p.4).

Both fields also have a history of **Interdisciplinary** practice and work—for example, medical treatment protocols might draw upon expertise from multiple healthcare specialists (e.g. nurses, surgeons, physiotherapists, etc). Similarly, design traditionally involves working with clients, experts and users from other fields. Over the years, interdisciplinary practice has continued to grow in tandem with the widening scale and scope of 21st century problems. As design theorist Don Norman (2014) notes, "complex problems require complex solutions" and in order to conceive innovative and effective solutions, teams composed of representatives from relevant disciplines are needed.

These shared values of design and healthcare—while not exhaustive—delineate the many areas where the two fields exhibit overlaps and can formulate common goals and pathways. Chamberlain and Craig (2017) declare that we have seen the two fields move from working independently to where "practitioners in design and health care have sought to work more closely together" to promote enhanced quality of life (p.3).

To situate these shared values and to interrogate how these fields work together in actual practice, in the next section, we present two recent research projects that bring together practitioners from across design and health.

Current Design Research Applications

Project 1: End-of-Life Care through Design: Visualising Places of Death

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MDes Thesis, University of Alberta (Canada), Aidan Rowe, (Supervisor)

How can design researchers apply their competencies to healthcare and uncover the ways in which patients, caregivers, and health professionals conceive of care? Can design help generate a humanistic understanding of where and why gaps emerge in health systems, organisations, and services?

In 2017, graduate student Knox formulated this project to explore these possibilities. Utilising design-led inquiry for health research, this Master of Design (MDes) thesis investigated the impact of the designed environment on the experience of dying within palliative sites.

Over the past few decades, the desire to enhance end-of-life care has become a globally relevant social concern, giving rise to new ethical questions about patient choice and end-of-life decision-making—not just in terms of how death occurs—but also where it may be situated. These questions further influence how we might design and build future health environments to cultivate ceremony, communion and ethos in what are often seen as functional and medicalized spaces (Worpole, 2009). While the relationship between built environments and human health has been explored before, relatively little research has applied evidence-based design principles specifically to spaces, processes and social frameworks of death and dying.

Accordingly, this research explored the roles and responsibilities of designers within contexts of end-of-life care in three steps:

> **Literature Review:** Through a discussion of existing literature on the relationship between health and design, it contextualised design thinking and evidence-based design practice within health-related problems. Drawing upon anthropological perspectives on the nature and meaning of places, it distinguished between geographic territory, locations imbued with social relevance, and sites historically associated with illness, death & dying. Next, it identified expectations and needs communicated by scholars working specifically within the subdomains of end-of-life architecture and palliative care design.

> **Field Research:** Primary research involved ethnographic observation within two distinct kinds of palliative care locations: a small community-based hospice in suburban Alberta (Canada) and at the intensive palliative unit of a large general hospital in a large city. Site research was conducted using an ethnography-derived model, using observational field notes, immersive walkthroughs, and photographic data. These were supplemented with in-depth, semi-structured interviews with end-of-life care professionals and experts, including health administrators, palliative nurses, bereavement counsellors, and palliative care research leaders. Data was presented through detailed content analysis.

> **Design Frameworks for End-of-Life Settings:** Using findings from primary research in light of previous gleanings from secondary literature, pragmatic recommendations were generated and compiled for the future design of palliative facilities. Finally, research was re-contextualised against the changing end-of-life landscape, noting some broadly emerging concerns around patient empowerment, improving integrative care, health system navigation, and public perceptions of dying-in-place.

In the continually evolving end-of-life landscape, patient-centred design has the potential to disrupt the hegemonic care models of mainstream medicine in conceptual as well as pragmatic ways. Anthropologist Jamer Hunt (2015) believes that, "[b]ecause people aren't working in a way that's been consciously and empathically designed, there are many unintentional bad moments that add to the difficulty of the situation." In the same vein, design critic Alice Rawsthorn (2015) notes:

> When well-designed technology can help improve our every living moment, why should it desert us in death? In theory, design could—and should—have a useful part to play in improving the quality of any aspect of daily life that is no longer fit for purpose, and death is no exception...[A]nalysing the strengths and weaknesses of present systems and rituals with an open mind, and applying grace, foresight, rigour, sensitivity and imagination to envisaging better outcomes could help us to die more humanely.

Numerous studies have shown that—despite the limitations of home-based care—patients, families and healthcare providers generally believe medical settings to be under-equipped for meeting the needs and expectations of dying persons (Murray et al, 2009). Stephen Verderber, Professor of Architecture and Public Health at the University of Toronto, writes that human beings are pacified by spatial conditions implying security, privacy, intrinsic meaning and value. He notes that the patient's ability to accept existential situations, find contentment with health services, and experience a sense of control—are all directly manifested in the physical appearance and design of care spaces (Verderber, 2010).

Dying is a sphere where "the interests of [the] government, religion, the law, capitalism and free will all converge, making it an unusually complex field." (Hunt, 2015) Design for end-of-life care, therefore, requires us to venture into the field with sensitivity, humility, and purpose. While design that celebrates, optimizes and sustains living conditions is plentiful, relatively little design concerns itself with death and dying. As a result, even within care spaces, palliative zones are much less visible or consciously designed than curative ones. In conceiving comfortable, empathic, aesthetic, and functional spaces, designers can help relieve patient stress and enhance satisfaction with the quality of care being received. This master's thesis argues that designing for death—one of life's most vulnerable and profound moments—falls directly within design's ambit and registers an urgent call to designers today.

Project 2: INTD 410: Co-Designing Health

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Patrick von Hauff, Academic Technology Specialist, Faculty of Medicine & Dentistry, University of Alberta (Canada)

What role could design play in creating educational environments to address intricate and essential issues in healthcare? How might design tools, methods, and processes be employed by non-designers in medical contexts?

The *INTD 410: Co-Designing Health* workshop was created to interrogate these possibilities.

In 2016, design researchers Rowe and von Hauff created a workshop aimed at introducing university students in healthcare to design processes and methods. The workshop—*INTD 410: Co-Designing Health*—brought together students from across different health practices (e.g. medicine, dentistry, physiotherapy, speech pathology, nursing, etc.) to work together using design methods to address health issues they encounter within their professional environments.

For many participants, this was the first time they were introduced to design through an academic lens, where we discussed—and enacted—how design can be operationalised. The 3 hour workshop was structured as a low fidelity, hands-on, studio-based session and was broken into three sections (each approximately 50 minutes long):

> **Part 1 — Setting the Scene (Meanings and Exemplars):** Beginning with definitions of design, we discussed a variety of design models, design professions and similarities between designers and health professionals. We ended the session with participants sharing examples of design within health that they were familiar with.

> **Part 2 — Tackling a Problem (Ideate and Own):** Groups (of 3 or 4 students) were created ensuring diversity of students from different health fields (to promote interprofessional learning opportunities and diversity of experiences). Groups identified existing problems or issues in health and articulated the context (settings, people involved, ramifications, etc.), noting down information on large format forms (provided to them with prompting questions). Groups also proposed potential design interventions (whether product, environment, or system) to address identified issues.

> **Part 3 — Exposition (Share and Communicate):** Groups came back together to share the results. Each group presented and contextualised their work to the entire cohort. To conclude, we drew out common themes and overarching narratives emerging across the work completed by all groups.

These workshops were designed to accomplish two main outcomes:

Communicate design tools, methods, and processes to non-designers: In the last decade, design has developed from a fairly specialized discipline to one that is recognised by many other non-design fields—e.g. business, engineering, etc.—as possessing fresh tools and skillsets for addressing a multiplicity of issues and

challenges (Golsby-Smith, 1996, p.5). This shift has been particularly evident in the proposition—often not by designers—that design thinking is a magical panacea that could unravel any problem or boost any industry (Pierri, 2018; Norman, 2014). This workshop was an opportunity for exploring how design's unique characteristics—as a problem-setting, collaborative, outcomes-focused, future-oriented activity—could be applied by non-designers to their own areas of expertise and practice. We believe that design as an academic and pedagogic area offers much to other fields. This workshop provided an ideal opportunity to model and test these offerings.

Embed interprofessional learning opportunities: Central to this workshop was the aim to test venues for interprofessional learning in healthcare education. It has been identified that stratified learning common within traditional health disciplines—nurses learn with nurses, surgeons with surgeons, etc.—is problematic (Shraiky & Lamb, 2013). As Buring et al (2009) note, a fundamental principle of interprofessional learning attempts to address this stratification, asserting "that if health professions students learn together at the beginning of and throughout their training they will be better prepared to deliver an integrated model of collaborative clinical care after entering practice" (p.1).

Since the initial running of two sessions of *INTD 410: Co-Designing Health* in 2016, the workshop—revised in response to researcher reflection and feedback from participants—has been run again in 2017 and 2018. The development team Rowe and von Hauff are also in the process of proposing a credit course for health care students that focuses on design and health.

In the next section, we identify some broader, key gains from integrating design methods, tools and processes within healthcare settings in these two described research projects.

Specific Benefits from Employing Design in Healthcare Settings

Both the research projects presented above—*INTD 410: Co-Designing Health* and *End-of-Life Care through Design: Visualising Places of Death*—integrated design methods within healthcare settings. We have identified specific benefits from this research.

Both of these projects employed **Participatory Approaches** where the researchers worked with participants—whether users, students, clients, or other experts—in rich and meaningful ways. The *End-of-Life Care through Design* project worked with a variety of participants through interviews, walk-throughs and observations. Health experts, academics, administrators, front line staff and patients were interviewed, and days were spent observing environments and how people worked and lived in health settings. The *Co-Designing Health* workshop used participatory methods within the session where students worked together negotiating possible responses to identified issues. The research team, attending faculty, and observers were also active participants throughout the workshop and this work was used to refine future instantiations of the workshop.

Participatory approaches—sometimes termed Co-Creation, Co-Design or Participatory Design— have a long history in situating design as human-centred activity where there is direct involvement of participants throughout the design process (Dimopoulos-Bick, 2018). This direct and continuous involvement of participants works to reveal the actual needs of users rather than those imagined, and allows for stimulating discussion and generates deeper understanding. As health researcher Jiwa (2016) observes, "by collaborating with patients to ensure their needs are met, we can ensure a more satisfactory patient experience" (p.1). Chamberlain and Craig (2017) frame this movement as collective creativity (p.5) and Cottam and Leadbeater (2004) note that the "biggest untapped resources in the health system are not doctors but users" (p.28). Participatory approaches from design are one means of engaging these users to help create healthier futures.

Each of the research projects were also **Future-Oriented**; their goal was to improve upon what was done before and situate these changes in the future. In the *Co-Designing Health* workshop, students identified current real-world healthcare issues and negotiated designed responses to address them. The *End-of-Life Care through Design* study identified specific recommendations for the design of future end-of-life care settings looking to improve current practices. As design researchers Noël and Frascara (2016) note, design "helps to envision new possibilities to enable people to improve health and healthcare" (p.9). Additionally, when design practice is situated in a future-focused frame, a plethora of possible outcomes are made possible. As Ward (2015) observes, "Designers materialise thought in order to push the boundaries of knowledge"—an act he later terms as "a leap into the material abyss" (p.229). This broader exploration of possible futures presents new avenues for innovation and triggers rich responses beyond incremental quality improvement initiatives. This wider scope of responses is urgently needed as the breadth and depth of healthcare challenges expands.

Interdisciplinarity was a key theme throughout both projects. Building further upon the specific histories identified in the *Shared Values: Design's Parallels with Healthcare* section, these projects—as Burns et al (2006) observe—positioned design processes "as a means to enable a wide range of disciplines and stakeholders to collaborate" (p.6). Through interdisciplinary teamwork and by building on its future-oriented focus, design "develops solutions that are practical and desirable" (Burns et al., 2006, p.6). Noël and Frascara (2016) also identify a need for "interdisciplinary collaborations that integrate design and health in a problem-based learning context" to address deepening complexities in modern healthcare (p.5).

Central to both projects—although not necessarily obvious at the onset—is the ability of design research to create **Expanded Scope of Possibility**. In conjunction with—and building upon—each of the three identified benefits of Participatory Approaches, Future-Oriented, and Interdisciplinarity, design research offers opportunities for revealing previously unconceived possibilities and extended realms of action. As Cottam and Leadbeater (2004) argue, when making the case for co-created design led services: "we need a different way forward: not further incremental innovation but rather radical transformation and a new approach" (p.6). Within the *End-of-Life Care through Design* project, researcher Knox noted that working with patient-participants exposed questions outside of the realm of the set research, notably new questions about equitable access to health services, ethical communication between health institutions and the public, and dignity and decision-making power at the end of life. Importantly, the master's research has now led to a doctoral project investigating these raised concerns, specifically, how palliative institutions communicate their positions on assisted dying issues and how patients navigate the healthcare system when and if they choose to receive an assisted death.

In addition to the benefits that design can provide in healthcare settings, there are also a number of challenges. We discuss some of the prominent issues in the following section.

Challenges and Experiences: Design Education, Research, And Practice in Health and Medicine Environments

Within the context of health research, interdisciplinarity is a frequently invoked and aspired-to ideal (Paradis & Reeves, 2012). Studies show that strategies and policies—adopted by health research funding agencies, public healthcare institutions, and academic organizations—to promote interdisciplinary practice and inclusive scholarship within the health sciences do not necessarily translate into practice as we would hope (Jacobs & Frickel, 2009). Designers—like other scholars and practitioners trained in the arts, social sciences, and humanities—continue to report several challenges faced upon moving into spheres of health and medicine (Dimopoulos-Bick, 2018).

The USA-based National Institutes of Health (NIH) calls for the study of complex health problems through a multi-lens approach in order to find innovative solutions to "health challenges that have been resistant to traditional research approaches" (NIH, 2007). Similarly, the Canadian Institutes of Health Research (CIHR) was formed with the aim to promote "the creation of new knowledge and its translation into improved health for Canadians" through "interdisciplinary, integrative health research" including "research respecting health systems, health services, the health of populations, societal and cultural dimensions of health and environmental influences on health, and other research as required" (Government of Canada, 2000, p.3e4). In response, most faculties of medicine in Canada have now declared their intention to support "a rich interdisciplinary environment of learning, practice, research and public service for all our students and faculty." (Faculty of Medicine & Dentistry, University of Alberta).

Despite the widely espoused belief that interdisciplinarity within health and medicine can support a holistic vision for global health futures, numerous reports demonstrate that the landscape of interdisciplinary research is fraught with real world hindrances and impediments.

As a field that has a long worked in partnership with other disciplines and professions, what do calls for interdisciplinary arrangements mean for designers and design researchers?

To begin with, **co-design practices and collaborative research creation are time-intensive, ambitious and complex undertakings.** Literature shows that interdisciplinary work done across and beyond traditional silos does not always result in superior research quality (Barry et al, 2008; Moore, 2011). In Groeneveld et al's study, design students, researchers and practitioners working in active health settings, reported a number of pragmatic challenges when operating across teams, including: health professionals' unfamiliarity with what

design research, user involvement, and design thinking entails; issues around team coordination and managing team relations; barriers in communicating the value of research; building rapport and establishing trust; time and financial considerations; inadequate sensitivity training for designers in relation to vulnerable persons and critical situations, to name a few (Groeneveld et al, 2019).

Additionally, **working across disciplines, professions and academic units** brings out clashes in epistemic values, work methodologies, and criteria for defining professional excellence among researchers and practitioners from different fields (Bauer, 1990; Lélé & Norgaard, 2005). Social science and humanities scholars acquire their training in a research culture where ways of doing, disseminating, and measuring meaningful work are markedly different from—if not dissonant with—practices, methods, metrics for realising outcomes in the health sciences.

When interdisciplinary scholars work with and within scientific communities, they enter a highly structured, institutionalized "market" (Bourdieu, 1971). In a study examining the experiences of social science and humanities academics employed within Faculties of Medicine across Canada, Albert et al (2015) found that the majority had to alter their practice in order to gain legitimacy among their medical colleagues, advance through academic ranks, and meet the evaluation standards of medical faculties. Having to thus adapt to the norms and cultures dominant in health-related environments, resulted in dissatisfaction with their careers and professional identities, alienation from peers in their parent disciplines, and diminished the rigour of work produced. This unfavourable situation "indicates the low value assigned to their research practices" and the expectation for interdisciplinary practitioners to adopt health research conventions "contradicts the principles behind interdisciplinarity: that experts from different disciplines collaborate to create better solutions to enduring problems" (Albert et al, 2015). Finally, it is important to acknowledge that **design cannot solve everything** and there will remain domains of knowledge outside its scope; technological and societal advancements to keep pace with; and practical constraints related to budget, timeline, scale, demand, and resources. Besides pragmatic restrictions, design is abound with ideological, pedagogical, and theoretical quandaries that require thorough critique as the field evolves, and especially, as it straddles new knowledge realms that have been historically dominated by other players and meaning-makers—whether clients, academic experts and or end users. Pierri (2018) cautions against the over-optimistic stance and uncritical framing of design as the new cure-all for complex social and health problems.

As such, designers need to recognise both the possibilities and constraints when exploring the use of design in healthcare settings.

Conclusion

The practice, delivery, and needs of healthcare provision are in a state of continual flux. External factors are drastically re-shaping the medical and health requirements of our population. The idea that design holds promise for resolving complex systemic and social issues is gaining traction worldwide. As Burns et al (2006) note, this new design field enables "a wide range of disciplines and stakeholders to collaborate" and develops a set of practical and desirable responses that "places the individual at the heart of new solutions" (p.6).

In this paper, we argue that design offers a powerful array of theories, practices and ways of thinking to help address key and pressing healthcare issues of today. As design practitioners, educators, and researchers, we need to be at the heart of situating design practices, methods and processes in this expanded field of practice.

The research presented through the two projects documented—*Co-Designing Health* and *End-of-Life Care through Design: Visualising Places of Death project*—are examples of our recent research that interrogate opportunities for change in design to contribute in impactful ways to 21st century healthcare provision.

In addition to design's shared history and similarities with healthcare practice, we identify four opportunities for design in healthcare settings: a focus on rich co-design participatory methods; design as a future-oriented activity; the role of interdisciplinary practice in design, and the expanded scope of possibility provided by and through design.

As noted design researcher J. Christopher Jones (1979) has stated, "It's clear to me that no big change is possible till we change ourselves and our ideas" (p. 33). We propose that design devises new possibilities for change and leverages its methods, theories and practices to address the pressing issues and challenges facing modern healthcare.

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Aesthetic Considerations in the Ortho-Prosthetic Design Process

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Medical products, including prosthetics and orthotics, are designed to partially or completely assist or replace the functionality of specific body parts affected by ailments or medical deformities. People using such devices share similar sensibilities and concerns, such as looking attractive or being able to wear fashionable clothing. However, due to a greater emphasis on function over fashion in designing these medical products, the aesthetic values of the user are not fully considered. This aesthetic paucity may have a strong psychological and cognitive impact, which affects the user experience. Hence, this study aims to explore key parameters affecting the aesthetics of medical products such as prosthetics and orthotics, and identify the challenges involved in their design process. Recommendations have also been suggested for the designers with the help of a design example.

Keywords: Aesthetics, Medical product design, Prosthetics & Orthotics design, User experience, User psychology

Introduction

The design of medical products is a huge industry worldwide, of which, a major interest has always been the design of orthotics and prosthetics. Orthotics are devices, which provide support or stabilize an affected part of the body. They are used in cases of reduced musculoskeletal functionality. In most of these cases, the orthotics are used as the external aid or body support (Sansoni, Wodehouse, & Buis, 2014). However, these supports can be used internally in the form of rods and braces. The most widely used orthotics include splints, braces, slings, compression sleeves, and insoles. There are some simple orthotic products that we use in daily life such as glasses or spectacles, but these have been transformed from simple disability products to a fashion icon (Pullin, 2009).

Prosthetic devices replace or enhance the functionality of a body part (Sansoni et al., 2014). They are used in cases of severe medical deformities or amputations. Other examples of prosthetic use include implants, artificial hearts and limbs. In previous studies, it is quite evident that the use of prosthetics not only aid the user by increasing mobility, but also helps in performing daily activities, thereby enhancing physical, social and emotional well-being (Murray, 2005; Pohjolainen, Alaranta, & Kärkäinen, 1990). The new science of "Prosthology" (Bache, 2008) deals with concept of the prosthetic part of the body being fully integrated as a new part of the body, as described by Gestalt's concept of totality (Giannini, Marzi, & Viggiano, 2011).

Limb amputation has many disturbing and irritating impacts on patient psychology (Horgan & MacLachlan, 2004; Whyte & Niven, 2001) often leading to stress and despair (Breakey, 1997; Williamson, Schulz, Bridges, & Behan, 1994). Product design studies (Bloch, Brunel, & Arnold, 2003; Creusen & Schoormans, 2005; Crilly,

Moultrie, & Clarkson, 2004) have suggested that the visual appearance of a product is one of the key elements affecting user choice and the product-user relationship. Visual aesthetics also have the tendency to make products more acceptable and effectively usable in many cases (Newell & Gregor, 2002) However this may differ across products and contexts. The overall appearance of a prosthetic limb is very important and may alter the level of the patient acceptance for the prosthesis (Biddiss, Beaton, & Chau, 2007; Cairns, Corney, & Murray, 2011; Carroll & Fyfe, 2004; Datta, Selvarajah, & Davey, 2004; Hagberg & Brånemark, 2001; Legro et al., 1999; Murray & Fox, 2002; Pillet & Didierjean-Pillet, 2001; Pons et al., 2005). However, in designing medical products, functionality is the designer's primary concern; with minimal attention given to product aesthetics. This can affect user experience and satisfaction. Most of the available literature is focused on the technical and functional aspects of prosthetics, with only a few studies dedicated on aesthetics, showing a lack of interest of designers and researchers in this area (Cheetham, Suter, & Jäncke, 2011; Klute, Kallfelz, & Czerniecki, 2001). In the case of hand prosthesis, a previous study (Kostuik, 1981) also describes a prioritization of functional usage over aesthetics . While, another study by Biddiss and Chau (2007) suggests prosthetic appearance to be a factor that significantly influences the decision to wear or use a wearable prosthetics. The decision of whether or not to wear a prosthetic may be based on the user's life style and personal needs (Durance & O'Shea, 1988; Hubbard, Kurtz, Heim, & Montgomery, 1997; Scotland & Galway, 1983; Wright, Hagen, & Wood, 1995). However, aesthetics play an important role in altering device adaptability. Additionally, if the prosthesis is purely functional but overly bulky, it can affect user acceptability and satisfaction. This can also have consequences which may affect the user's psychology state and social interactions skills (Bhuvaneswar, Epstein, & Stern, 2007). In order to avoid such situations, it is important to focus on the aesthetics of prosthetics.

Several studies have shown that the acceptability of medical products can be improved significantly by addressing their aesthetics (Goiato, Pesqueira, Ramos da Silva, Filho, & Micheline dos Santos, 2009; Newell & Gregor, 2002; Power, Leaper, & Harris, 2017; Sammartino, Marenzi, Di Lauro, & Paolantoni, 2007). However, a very limited number of studies (Nicola Cairns, Murray, Corney, & McFadyen, 2014; S Sansoni, Wodehouse, & Buis, 2014) have been conducted in the area of medical product design aesthetics. The majority of these studies have mainly focused on improving the aesthetics of upper and lower limb prosthetics (Davies, Rode, & Cywes, 1977). There is still a wide range of possible medical products, whose designs can be optimized by improving their visual appearance and aesthetic properties.

In this paper, the authors explore the field of medical product aesthetics. Some valuable suggestions and recommendations for medical product designers with the aim of improving user experience and satisfaction have also been discussed.

Customary design attitude of Ortho-prosthesis and need of aesthetics

Conventionally, medical personnel such as doctors, physiotherapists and prosthetists are typically involved in the ortho-prosthetics' design process in order to ensure functionality. In the case of prosthetics and orthotics, functionality is important for enhancing mobility and fundamental in performing activities of daily living. However, the aesthetic value of the product is generally neglected or only considered after the users functional requirements have been met (Gotzsch, 2000; Jordan, 2000; Lewalski, 1988; Maslow, 1970; Rutter & Agne, 1998; Viemeister, 2001; Yalch & Brunel, 1996). Functionality is often considered as the cutoff requirement in process of designing medical products unless the product have some clear marketing value based on fashion and styling only. As the industry shifts towards user-centered designs, user experience has gained considerable importance and mainstream designers are increasingly aware of the impact. Hence, medical product designers now need to focus on product aesthetics as well as functionality.

Today, we live in a world where bodily perfection and beauty are given a high priority. People who use medical products such as prosthetics encounter challenges related to aesthetics such as social validation and acceptance (Hughes, 2000). Often unacceptance based on image and aesthetics can cause feelings of social exclusion. Limb amputees face extreme difficulty in accepting new prosthetic modifications to their body (Sjödahl, Gard, & Jarnlo, 2004) which can often lead to depression. Prosthetic users tend to avoid public exposure and are more prone to social isolation due to feelings of awkwardness and being self-conscious. These behaviors can affect psychological wellbeing, self-esteem and the ability to interact in social situations. (Sansoni, Wodehouse, McFadyen, & Buis, 2015).

Design aesthetics play a significant role in changing user behavior and product preference. A designer from Reebok theorized the value of good design by stating that "good design can make you fall in love with the

product" (Dumaine, 1991). By improvising upon aesthetic features, users can have an opportunity to actively or to passively express themselves in their own unique way. Styling can enhance the acceptability of prosthetic usage among amputees by having positive psychological impacts. This can have positive effects on self-esteem and confidence. Hence, it is tremendously important to consider aesthetics when designing medical products.

Parameters of aesthetics affecting user experience

Incorporating natural elements in aesthetic improves the user experience and acceptance. Many designers have used natural and organic elements in the product design process such as those found previously in Art Nouveau (Weisberg & Menon, 1998). Organic elements not only mimic abstract human forms but can also be used as a stylistic element when designing prosthetics. Due to the level of craftsmanship and material handling involved, natural forms were considered to be difficult to manufacture. However, with emerging technology and ease of use of techniques like 3D scanning, modeling and printing, it has become possible to design and customize aesthetically pleasing medical orthotic and prosthetic devices based on personal preference. In the following sections, the authors attempt to explore the current aesthetics issues of existing medical products and provide some possible suggestions and recommendations for improving these aesthetic elements.

Shape and form

The shape and form of a medical device primarily defines its visual appearance. A study (Nicola Cairns, Murray, Corney, & McFadyen, 2014) attempted to investigate the factors affecting user satisfaction. They found that the most important factor suggested by the users was the shape of the device and how it matched the corresponding part of the body. For prosthetics, shape is an important element related to both functionality and aesthetics. Another study (Sansoni et al., 2015) had similar findings. By exploring the relationship of Uncanny Valley and prosthetic devices. Uncanny valley is a hypothesized relationship between a prosthetic's human-likeliness and individual's emotional response to them. In the study, they selected 30 different designs with three different types of forms – artificial looking devices, devices with moderate human-likeness and devices with high human-likeness. Based on their results, the level of user attractiveness increased in proportion to the human-likeness of the device's form. This demonstrates the importance of designing devices with shapes that resemble or mimic real body parts. Conversely, other studies also suggest that this can generate negative moods instead of feelings of attraction (MacDorman, Green, Ho, & Koch, 2009). Therefore, the impact of shape and form in the design process of ortho-prosthetics should be kept in considerate balance in order to promote user acceptability.

One of the key challenges in achieving an ideal product shape is the packaging and placement of functional elements (i.e., electro-mechanical components). For instance, some battery-powered medical devices, battery placement can be problematic if it is not considered during the design process. These elements can affect product aesthetics and lead to user discomfort.

Pye (1978) suggests that workmanship and the development process also play a major roles in the form of the final product. With 3D scanning technology, it has now become possible to acquire accurate anthropometric data, which can be used to develop accurate digital human models (Shah & Luximon, 2018; Zhuang & Bradtmiller, 2005). It can also be used to develop highly customized medical products. With the continued improvement of 3D printing facilities, it become possible to produce such forms with a high level of precision and superior finishing.

Wearable art is one of the potential future trends in medical product manufacturing Wearables can be customized to fit a particular set of functional requirements and customary aesthetic elements for every user. Existing orthotics and prosthetic devices could then be made to look like wearable art forms that blend with the users clothing. Aesthetics and functions can fused together in this way to give psychological pleasure as well as the feeling of fashion and peculiar style sense. The aesthetics of shape and form may differ based on gender. Previous studies (Oumlil & Erdem, 1997; Weitz, 1998) have demonstrated differences in the choice of prosthetics that were based on gender perceptions.

In designing prosthetics for children, designers should make an attempt to stretch the boundaries of their imagination in order to make products interactive or in the form of wearable toys. Some research groups (Knochel, 2016) have also tried to develop Do It Yourself (DIY) types of prosthetics where the user is given the liberty to design their own device. A South African carpenter who lost his hand due to occupational hazards, sought a customized DIY prosthetic hand. He developed it using online resources and the help of a special

effects artist (Owen, 2011). In addition to individual and laboratory-based applications, DIY prosthetics have also been developed as a manufacturing solution for amputees with the ubiquity and greater availability of more economical 3D printing facilities. The process of DIY ortho-prosthetic design and manufacturing can create new opportunities and facilitate in the design process of medical products.

Size and scale

The size of the product has a substantial impact on visual appearance. Size and material affect the weight of the device. If it is too large, it may cause discomfort and may be inconvenient for daily usage. Minimizing the size and visual prominence of prosthetics is important. Although reducing the size of a device may be more costly and technically challenging, it has a positive impact on patient's psychological well-being. Current braces have metallic parts, which are difficult to conceal under regular clothing. Smart textile materials can be used in place of metallic components to maintain product aesthetics. However, if it is not possible to reduce size or to make a device more compact, then efforts should be allocated to make it unnoticeable and discrete in nature.

The size of a prosthetic should also conform to individual differences in body type to ensure that it maintains perfect symmetry with the contralateral part, side or limb. In order to develop products, which are generalizable and can be scaled according to a broader user base, it is important to understand individual variance in shape amongst the target audience. This can be accomplished by developing a database containing large anthropometric data samples based on country, location, ethnicity, age and gender of end users. Customization techniques like casting; last formation, which have been traditionally used, can be replaced by 3D scanning and modelling to achieve better results. In addition, modularity in ortho-prosthesis can be introduced at a grass root level to optimize device size and fitting. The concept of modular design can be implemented to achieve a "one size fits all" design methodology for mass production and may help to stabilize the user market.

Colour

A lot of research has already been conducted on the relation between colour, user perceptions and product selection (Funk & Ndubisi, 2006; Kauppinen-Räisänen & Luomala, 2010; LoBue & DeLoache, 2011). Although the range of colour options for medical products is limited, still the colour of the product contributes heavily in the product appearance.

In the case of orthotics, there is more flexibility to experiment with different colours compared to prosthetics. Depending on the application and user demands, products can be made transparent or incorporate colour to stimulate concealing. The product design value for users changes when the product style or design parameters also change (Holbrook, Morris B., & Moore, 1981). For instance, traditional dental braces use metallic wiring to correct alignment issues. However, they are not aesthetically pleasing and often make eating difficult for the user. Recently, several dental product manufacturers have started producing transparent dental braces without the slightest compromise on functionality. This example illustrates the influence of colour preference in producing a positive user experience without sacrificing functionality.

With prosthetics, many users prefer the product to be similar to the tone of human skin. Due to the limited amount of colour options for prosthetic devices, matching a user's skin colour is challenging and may influence product acceptance. This could lead to a psychological unacceptance of the product as a part of their own body. Some users prefer their prosthetic devices to be more vibrant and colourful. Several new prosthetic limbs with printed artwork have been made available, which have been well received and successful among young users. Similarly researchers (Lenhart & Sumarriva, 2008) have tried introducing printed cartoon characters on orthotics designed for children which have been very effective. Body art's fashion trends such as tattooing are additional design possibilities whereby prosthetics can be perceived as more of a fashion statement rather than a reflection of personal limitation or disability. An intensive care must be taken to make the colour of the device/product as natural and as iconic to meet the user's acceptability and psychological treat. The user should take certain cultural considerations into account when incorporating this type of device customization as it may not be appropriate for mass production. Interchangeable design skins may be a viable option in such circumstances. It is important to understand user needs and preferences when choosing the colour of ortho-prosthetic devices.

Material and texture

Material selection is a key step in orthotic/prosthetic design. From the perspective of product design, material characteristics have a strong impact on the physical product (De Sausmarez, 1964; Hannah, 2002; Scott, 1951). It is important to ensure the material selected has the necessary mechanical and physical properties required for the functional needs of the user. Concomitantly, careful consideration must be given when addressing more intangible characteristics like perceived values, personal associations and emotions. A study by (Karana, Hekkert, & Kandachar, 2008), provides a detailed summary of key parameters to be considered by designers when selecting materials with a greater emphasis placed on the intangible characteristics of materials for improving the product design process. With advancements in material research and technology, it is possible, with new material options, to satisfy these intangible needs.

In addition, care must be taken to make sure materials should be waterproof so that they can be suitable for various outdoor conditions. Water and sweat could be the potential causes for the invalidation of functional aspects and strongly destroy the aesthetical appraisals of amputee. Excessive sweating may lead to itching, irritation and sores, causing unwanted discomfort to the patient, making it less desirable. The material used should be easy to clean and should not allow colours to fade.

Most medical prosthetic devices use metallic components to provide the necessary mechanical strength and polymers or plastics for the external encasing. Newly developed inert materials such as fiberglass, biopolymers and various metal alloys have been used to improve mechanical strength. The synchronization between user perception and product material should also be considered. Material texture preferences may be influenced by gender and various socio-cultural factors. Material, which mimics skin, may or may not be desirable depending upon the circumstances. More research is needed in this area.

Adaptability to fashion and clothing

Just like physically fit human beings, people with special needs also have the desire to be perceived as attractive. An individual's appearance is highly affected by the style of clothing and fashion accessories being worn. However, the ability to use the prosthetic under fashionable clothing is an aspect often overlooked by medical practitioners when designing the device.

Velcro straps can be used to affix bulky orthotic splints and braces which are often prominent, detract from personal aesthetics and make it difficult to wear clothing over top. Due to bulkiness and prominent visibility of prosthetic devices, the range of clothing is limited Current design technologies have the ability to produce customized and sleek products which can be either hidden under clothes or can blend with an ensemble by matching the contour of an individual physique.

The majority of lower limb prosthetics are designed for wearing normal flat-soled footwear. This reduces the number of footwear options and may negatively alter the biomechanics of the prosthetics predisposing the user to postural imbalance and injury. Hence, there is a need for designing adjustable ankle prosthetics, which not only support body weight but can also adapt to different types of footwear.

Following fashion and style trends are often important for the reasons of personal aesthetic preferences. The aforementioned design considerations would help ortho-prosthetic users have greater autonomy and fewer limitations when it comes to choice of clothing. This could have positive effects on social interactions psychological well-being and self-confidence.

Other factors

Factors like age, gender, cultural affiliations and personal attitude affect consumer aesthetic tastes (Bloch, 1995; Ji, Peng, & Nisbett, 2000; Salkind & Salkind, 1997). Previous studies have shown that males prefer more masculine product patterns whereas females are more inclined towards products of beautiful and elegance (Sansoni et al., 2015). Regulatory and legal factors also affect material selection as products often needs to comply with standards approved by the Food and Drug Association (FDA).

Other factors, which also affect the design process, include the cost of manufacturing and affordability of the target users. However, aesthetics should not be compromised based on manufacturing costs or material selection. Although traditional manufacturing processes help in producing more economical medical prosthetics in mass scale, 3D printing has proven to be highly cost effective concerning the customization of products. 3D printing can also avoid f material waste incurred during the casting and manufacturing process. In

addition, 3D printing techniques can be used to facilitate a modular development of ortho-prosthetic devices for individual customization.

"Toe Talk", prosthetic limbs that make a statement: A case study

Wide range of artificial prosthetic limbs are already available which help users (i.e., amputees) perform various daily activities including walking, jumping and even running. However, the majority of prosthetics limbs currently available are designed without considering aesthetic elements, which may make them undesirable for younger amputees. Hence, an alternate means by which the aesthetics of these prosthetic products can be improved upon without compromising function is needed. This will significantly improve the user experience of young amputees.

In this case study of prosthetic limb socket, a design group explored the opportunities of redesigning a prosthetic limb socket into a modular wearable art, which can give users the liberty to express their uniqueness without hampering the functional aspects of the device.

Design approach – Modular design

Modular designs are based on the concept of separating products into multiple parts, segments or modules that can be individually modified and customized (Duray, Ward, Milligan, & Berry, 2000). Recently, a large number of research contributions have been made in this particular area. A study done in 2014 proposed a similar approach (Seok, Woo, & Lim, 2014), which they termed "Non-finito" product design. The products are intentionally unfinished giving users the option to customize and complete them based on their own personal choices and creativity. This kind of approach can help in achieving mass customization and facilitate product design flexibility based on individual preferences. Allowing users to be actively involved during the design process can help to initiate a better product-user relationship, which would better address the user's needs. This can also make the potential problems encountered in the design phase more visible to the designers.

However, this type of design approach is seldom adopted in the field of medical product design. Therefore, the team attempted to incorporate the concept of a modular design approach without compromising the primary function (i.e., locomotion and movement) of the prosthetic limb.

Design Method

A 25-year-old female amputee agreed to participate in the study. In order to understand her needs, a semi-structured interview was conducted in conjunction with an observational study to define her user profile and understand her daily routine. Based on this study, initial insights about fundamental design needs were acquired. Her input from the interview was considered throughout the design process to ensure the final product (i.e., prosthetic limb socket) did not affect the functionality of the prosthetic limb.

Based on the data gathered from the interviews and observational study, an initial brain storming session was performed. Using the principles of modular design, multiple prototypes were developed using 3D modelling software. Then based on the user preferences, a design was selected and further refined.

For developing the prototype, a 3D scan was acquired for the stump of the amputated limb. Based on the acquired 3D model, a customized prosthetic limb socket was developed using a computer aided designing/manufacturing (CAD/CAM) software. The final design prototype was then printed.

Design requirements

Being a marathon runner and sports enthusiast in the past, the participant did not want her amputation to affect her self-image. Upon interviewing her, it became evident that she was not happy with a conventional prosthetic leg. She felt it looked ugly and did not allow her to wear fashionable clothes or shoes (i.e., high heels). Instead of hiding her imperfections, she wanted the prosthetic to be a more prominent bodily feature in order to serve as a source of inspiration and encouragement for other amputees. In addition to these design expectations, she also expressed the need for a prosthetic that was easy to wear and store when not in use, the possibility of attaching it with existing prosthetic limb, the ability to reduce sweating with greater ventilation capacity and further modifications to improve durability. Additional factors for consideration included the shape, size, colour, material and manufacturing process.

Design process – prosthetic limb socket

To address her needs, multiple design ideas were generated from the brainstorming session as shown in Figure. 1. The brainstorming session focused on three major criteria: (1) wearable art, (2) mix and match and (3) inner maturity. Several rough sketches and iterations were developed (Figure 2).

Figure 1: Brainstorming for the design

Figure 2: Ideation Process

During the ideation process as shown in Figure 2, initial ideas were further reduced to seven designs based on user preference, choice and needs. Various art and cultural elements were considered during the selection of the opted designs leading to the final design shown in Figure 3.

Figure 3: Final design of prosthetic socket

There were three major elements incorporated in the design to make it more appealing and serve as an identity statement for the participant. The first element that was considered was the shape of the socket. It was designed with a mesh form, which made it look more artistic, and at the same time reduced the contact surface thereby allowing it to be more breathable and less prone to accumulate moisture from sweating. Several attachment sites were provided along the device where she could place some text or messages.

The second element of the socket was its use as a wearable form of art. Provisions were made to ensure that certain parts could be removed and replaced. The user can easily slide various images, messages, and photographs in the designated sections of the device based on her mood, clothing combination, life events or the type of event she plans to attend. This provided her with an opportunity to be more creative and allowed her the freedom to use the device as conduit for self-expression.

The third element targeted the issue of using the new design with an existing prosthesis. A two-layered design was created to address this issue. For the existing model, only the outer case design was 3D printed and placed over the existing socket. For developing a new one, the internal frame replaced the socket.

To confirm the shape and size of the newly developed socket matched the contralateral limb, a 3D scan of the existing limb was also acquired to serve as a reference during the entire design process. This was done to ensure limb symmetry and avoid any bulky appearance beneath her clothing thereby allowing her to have a greater range of compatible clothing options.

Based upon her preferences, the prosthetic limb socket was developed in white colour so that it could match any clothing colour. White made it more vibrant, elegant, less likely to absorb heat. In addition, the white background made the other design elements (i.e., attachable text, removable images, and artwork) more prominent.

The final prototype was named "*Toe Talk*", as this gives young, active amputees a chance to express their uniqueness. Unlike traditional prosthetic designs, it is very elegant and artistic.

Figure 4: 3D printed prototype – prosthetic limb socket

The designed prosthetic socket was 3D printed and provided to the participant. However, due to structural issues, the design required further refinement. The 3D printed prototype of "Toe Talk" is shown in Figure 4.

Conclusion

Allowing the end user to be more involved in the design process having user-oriented design (UOD) approach can improve upon conventional approaches to ortho-prosthetic device development. With the advent of modular design techniques, it is now possible to develop products, which are partially or entirely customized based on personal preference. Involving the user in the design process has positive psychological benefits and gives the user a platform for highlighting their creativity.

Maslow's hierarchy describes three different levels of user needs. These encompass basic, psychological and self-fulfillment needs. Traditional ortho-prosthetic devices address basic functional needs and allow the user to perform daily activities. Psychological well-being and self-fulfillment needs can also be met by addressing device aesthetics

Ortho-prosthetic product design is a vast and constantly evolving field, which has undergone rapid growth. In past few decades, product designs for amputees have transformed from simple mechanical devices to highly sophisticated bionic devices. However, the aesthetic features of these devices have received little consideration. Studies have shown that the absence of aesthetics can have negative psychological and cognitive consequences for users.

This study attempted to identify some of the key aesthetic parameters, which influence the ortho-prosthetic design process. The authors have provided relevant suggestions and recommendations for addressing these issues with a modular design approach. A case study involving the design of a prosthetic limb socket was given to elucidate the benefits and implications of this user-centered approach.

Developing a single product, which satisfies the needs of every individual user, is challenging. There are social, psychological, economic, cultural and personal preference factors, which influence user perception and experience. Modular and DIY design approaches can help to address these issues by allowing the user to be more actively involved in the design process. With a modular design approach, it is possible to customize prosthetics based on the user's requirements. Users can also employ a DIY design approach by combining different prefabricated parts to manufacture their own product. This could facilitate the customization of such products on a mass scale. Additionally, designing ortho-prosthetic devices in the form of wearable art could revolutionize the field of medical product design and add an element of fashion to the customization process. Not only with this allow the user the option of incorporating their own sense of style or fashion into the development of their device but it can also create awareness for the inclusion of amputees across various social contexts.

For ortho-prosthetic device users, better product aesthetics are more than simply a means of flaunting or showing off, but means by which they can look and feel beautiful or be able to wear fashionable clothing like other people around them. Amputees have the same needs and desires as non-amputees. Meeting their needs is achievable when designers can give the opportunity to reevaluate the ortho-prosthetic' design process with the objective of enhancing user acceptance in mind.

Acknowledgement

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Exploring the role of Design in the context of Medical Device Innovation

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Technology is the leading driving force in healthcare and medical device design, however, innovations which emerge from these practices are often driven by clinical requirements. Such innovations are focused on developing products that addresses current health issues, diseases or medical problems – often lacking consideration of the end users' needs. Design innovation advocates that user-centred design happens much earlier in the product development process so that the patient needs are prioritised. However, this emerging field is yet to be defined and explored in a medical context. This paper therefore proposes a framework of Medical Device Design Innovation to explore the role of design in medical device innovation through two medical device case studies. The proposed framework suggests a way to navigate the nuances and complexities of the medical device industry in order to put the patient first while ensuring commercial viability.

Keywords: Medical device design, patient centred design, design innovation, ventricular assist devices, ankle-foot orthoses

Introduction

Medical device manufacturers create life-changing innovations through the collaborative expertise of various disciplines including engineering, manufacturing, clinical, regulatory, marketing, sales and business specialists. The role of the designer is often that of user advocate (Privitera, Southee, & Evans, 2015). However, the design team may also be responsible for aesthetic design, form giving, human factors application and testing, along with implementing contextual inquiry and/or ethnography methods (Petrie & Copeland, 2011; Privitera, 2017). Appropriate use of design tools and methods ensures that the user experience is championed from the early stages of product development and continues throughout the product development process as design trade-offs need to be made (Norman, 1986).

While cutting-edge technology advancement in medical device design is absolutely vital, it is the overall experience (cognitive and emotional) which impacts on the daily life of the patient and caregiver (Bate & Robert, 2006). Exemplary medical device design integrates technology development with user needs (Martin & Barnett, 2012). According to Martin and Barnett (2012), medical device manufacturers are motivated to conduct user research for regulatory compliance during the product development process. Both the European Union and the US Food and Drug Administration (FDA) require that human factors engineering processes be followed and standards be met, demonstrating that ergonomics, human factors, or user-centred design have been considered (International Organization for Standardization, 2015; Martin & Barnett, 2012). Similarly, funding for medical research requires technology developers to prove relevance to 'users' or 'stakeholders' for the healthcare research funding decision process (Martin & Barnett, 2012). Human-centred design should be central to all medical device development to ensure that user needs are met. However, user involvement

often comes later in the product development process, when the form and function has already been determined, and the ability to innovate based on user needs is limited due to a number of fixed parameters (Throckmorton, Patel-Raman, Fox, & Bass, 2016). The technological aspects of product development are often separated from the user aspects or only function to determine product appearance (Jones, 2013; Martin & Barnett, 2012). Schaeffer (2012) describes the role of human factors in this process as "prevention through design", to minimise risk by preventing human error, adverse events, and product recall.

Design innovation advocates that user-centred design happens much earlier in the product development process so that patient needs are prioritised. It is anticipated that the participatory methods used in design could tap into the tacit knowledge of stakeholders (i.e., practitioners, patients and caregivers) and identify their latent needs. This paper therefore explores the role of design in ensuring that patient needs become a point of focus in the development of medical devices, with the aim of improving the patient experience. To understand how the design innovation model could be applied specifically to the challenging field of medical device innovation, the Medical Device Design Innovation framework is presented and explored through two medical device case studies, including: Ankle-Foot Orthoses (Class I); and Ventricular Assist Devices (Class III). The proposed framework suggests a way to navigate the nuances and complexities of the medical device industry in order to put patients first whilst also ensuring commercial viability.

Literature Review

The Complexity of Medical Device Design

Designing a medical device is exponentially more complicated than designing a consumer product (such as a new cutlery set or even an electric toothbrush), and thus traditional definitions of design-driven innovation (Verganti, 2009) may appear naive and oversimplified when overlaid into this field. Many medical devices are not simply distributed or sold direct-to-consumer or the end-user, which is especially true for devices Class II and above. A number of conflicting considerations mean that desirable product aesthetics and meaning-making are much more complex to attempt – often requiring significant compromise. Among others, these considerations include: uncertainty, regulatory environment, complicated diagnostic pathways, complex payment models, biocompatibility of materials and patient compliance (Hanna, Manning, Bouxsein, & Pope, 2001; Hunink et al., 2014; Kucklick, 2013; Lynch et al., 2015; Narayan, 2012; Wimms, Richards, & Benjafield, 2013). Additionally, all medical devices, if sold in the US, must conform to detailed FDA General Regulatory Controls.

Much of the literature on medical device design or innovation stems from the field of engineering, e.g., the work of Ogrodnik (2012). Subsequently, technology is the leading driving force in healthcare and medical device design (Thimbleby, 2013). There is a gap in the research for understanding how innovation driven by design (i.e. design innovation) can be used to address the needs of users holistically in a way that generates value for a diverse range of stakeholders. Such stakeholders are limited not only to patients who receive clinical treatment with medical devices, but also medical device manufacturers, insurance companies, governments, regulatory agencies, healthcare providers, hospitals, clinicians, healthcare practitioners, surgeons, home medical equipment providers and patient caregivers. This gap becomes more pertinent to address due to the notion that medical devices must, in some way, interface, interfere and intervene with the human body (U.S. Food and Drug Administration, 2018). Thus, the risk of mechanical, electrical, system or technical failure is more critical than that of a standard consumer product, justifying the need for a strict regulatory environment which strongly influences when and how innovation is able to occur. However, it cannot be denied that a blurring of the boundary between consumer and medical products has taken place in recent years (Shinbane & Saxon, 2016). In the modern era we live in, patients expect their medical devices to operate and function as well as (if not better than) the consumer products they interact with on a daily basis (Nilsson & Sheppard, 2018). Thus, there is increasing interest in testing consumer innovation models for their applicability to more highly-regulated and high-risk industries such as medical device product development.

Medical Device Classes, Risk, Complexity and Design Innovation

For this paper, we refer to the three classes of medical devices according to the FDA classification system (see *Table 1*), since the US is one of the biggest market influencers in medical device product development. However, the authors recognise the scope of classifications for medical devices across different regions.

Table 1: The three classes of medical devices according to the U.S. Food and Drug Administration (BMP Medical, 2018; Sikorski, 2019; U.S. Food and Drug Administration, 2019a; White, 2018) *and FDA Regulatory Requirements for Medical Devices before release onto the US market* (U.S. Food and Drug Administration, 2018e, 2018d, 2018c, 2018b)

Class	Risk	Description	Examples	FDA Regulatory Requirements
Class I	Low to Moderate	Devices are common, everyday medical devices, involving less sustained contact with a patient, and are generally would not in contact with internal organs. Majority of devices are either exempt from the regulatory process or subject to the minor regulatory requirements. Class I devices present a low barrier and are straightforward to bring to market – yet are still subject to FDA General Controls which constitute a series of standards for all medical devices.	Ankle-Foot Orthoses, Tongue Depressors, Enema Kits, Elastic Bandages, Exam Gloves, Surgical Caps, Crutches, Slings, Mechanical Wheelchairs, Toothbrushes, Dental Floss, Stethoscopes, Forceps, Nasal Dilators, Hearing Aids, Bedpans, Device Accessories (e.g. Cleaning Brushes)	General Controls, i.e.: ☐ Adulteration ☐ Misbranding ☐ Device registration and listing ☐ Banned devices ☐ Notification and repair, replacement, and refund ☐ Records and reports ☐ Restricted devices ☐ Good Manufacturing Practice And, if new and novel: Premarket Approval (PMA) or if PMA exemption can be proven; 510(k) – Premarket Notification showing substantial equivalence
Class II	Moderate to High	Devices may be diagnostic or come into contact with a patient's internal organs. In addition to General Controls, Class II devices are also subject to Special Controls due to the added complications involved in providing reasonable assurance of the safety and effectiveness of such devices. Class II devices also undergo the FDA's Premarket Notification 510(k) process to justify the device's equivalence to another device that has already been legally marketed, thus demonstrating safety and effectiveness.	Surgical Meshes, Condoms, Hypodermic Needles, Acupuncture Needles, Neonatal Incubators, Catheters, Blood Pressure Cuffs, Powered Wheelchairs, Infusion Pumps, Blood Transfusion Kits, Vacuum Regulators, Wheeled Stretchers, Breast Pumps, Pregnancy Testing Kits, Electrocardiograph (ECG) Machines	General Controls; 510(k) – Premarket Notification showing substantial equivalence plus device-specific Special Controls: ☐ Performance standards ☐ Postmarket surveillance ☐ Patient registries ☐ Special labelling requirements ☐ Premarket data requirements ☐ Guidelines
Class III	High	Devices in this category support or sustain life, are implanted, or exhibit potential significant risk of injury or illness. Novel devices and unproven technologies also fall under this classification. In addition to the other regulatory controls, Class III devices must also undergo the FDA Premarket Approval (PMA) process to prove safety and effectiveness – involving a rigorous scientific study requiring clinical trials, unless an exemption can be proven.	Ventricular Assist Devices, Pacemakers, Defibrillators, High-Frequency Ventilators, Aortic Stents, HIV Tests, HPV Detection Kits, Replacement Heart Valves, Neurosurgical Lasers, Intrauterine Contraceptive Devices (IUDs), Cochlear Implants, Foetal PH Monitors, Implanted Stimulators (for people with Parkinson's disease), Implanted Prosthesis	General Controls; plus Premarket Approval (PMA) including: ☐ Technical data ☐ Non-clinical laboratory studies data ☐ Clinical investigations data Or, if PMA exempt can be proven; 510(k) – Premarket Notification showing substantial equivalence

The major distinguishing factor between medical device classes is risk (BMP Medical, 2018). Increased design complexity correlates with increased risk (*Figure 1*). Class I and Class II devices are characterised by a lower barrier to entry and a reduced risk (University of Limerick School of Design, 2019). Thus, design and design innovation are being explored and showing prevalence in the domains of Class I and II medical devices due this reduced risk and lower barrier to entry (University of Limerick School of Design, 2019). It has been shown that a design innovation approach can lead to highly-successful outcomes for design interventions based upon deep customer insight for lower-risk industries such as consumer electronics, travel, and fashion retail (Wrigley & Straker, 2018), and is also beneficial applied to social innovation projects (Haines-Gadd et al., 2015). Similarly, lower-risk classes of medical devices such as healthcare diagnostics lend themselves well to a design innovation approach (Kyffin & Gardien, 2009). Nevertheless, there is a paucity of data regarding the use of design innovation in field of high-risk Class III medical devices (see *Figure 1*). Due to the higher barrier to entry and increased risk, little is known about the value of design innovation in Class III medical devices. This is unfortunate, as an approach which considers the needs of patients (rather than purely technology) at the onset of design can have significant ramifications for patients' quality of life. It is understandable that this proposition might encounter industry resistance since proper user research and successfully integrated user-centred design may result in challenging the entire fundamental concept behind a medical device (Martin & Barnett, 2012).
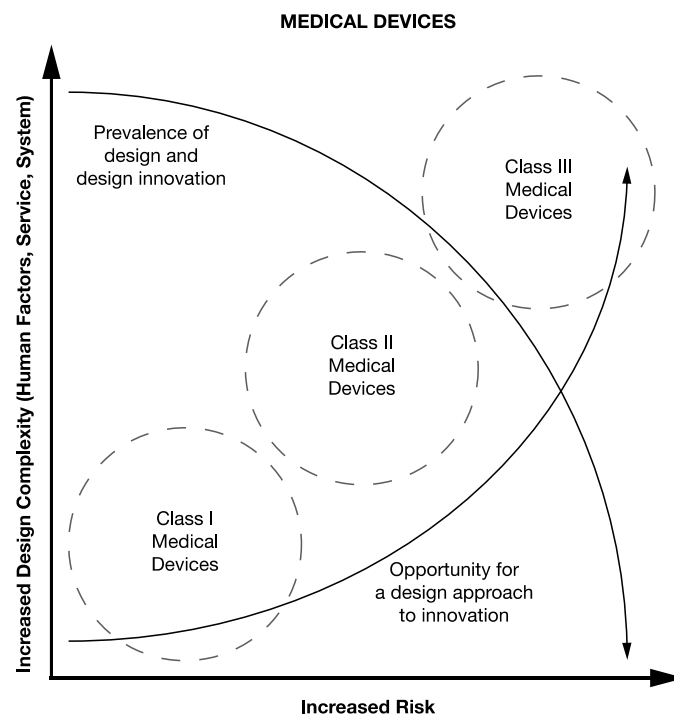
Figure 1: Three classes of Medical Devices correspond to increased risk and increased design complexity (including the human factors, service and system). An opportunity for Design Innovation to move into Class III medical devices exists. Adapted from University of Limerick School of Design (2019)

Introducing the Medical Devices Design Innovation Framework

According to design thinking principles, innovation occurs at the intersection of human desirability, technical feasibility, and business viability (Brown, 2009; IDEO, 2019). When lifted to the strategic level, according to design-led innovation principles, an innovative design outcome results when technology (i.e. the core intellectual property) addresses user needs through human-centred design and also disrupts the existing business model with a strategic value offering (Bucolo, Wrigley, & Matthews, 2012; Wrigley, 2017, p.236). Building on both the design thinking model and the design-led innovation model (see *Figure 2*), here the authors introduce the Medical Device Design Innovation (MDDI) framework (see *Figure 3*).
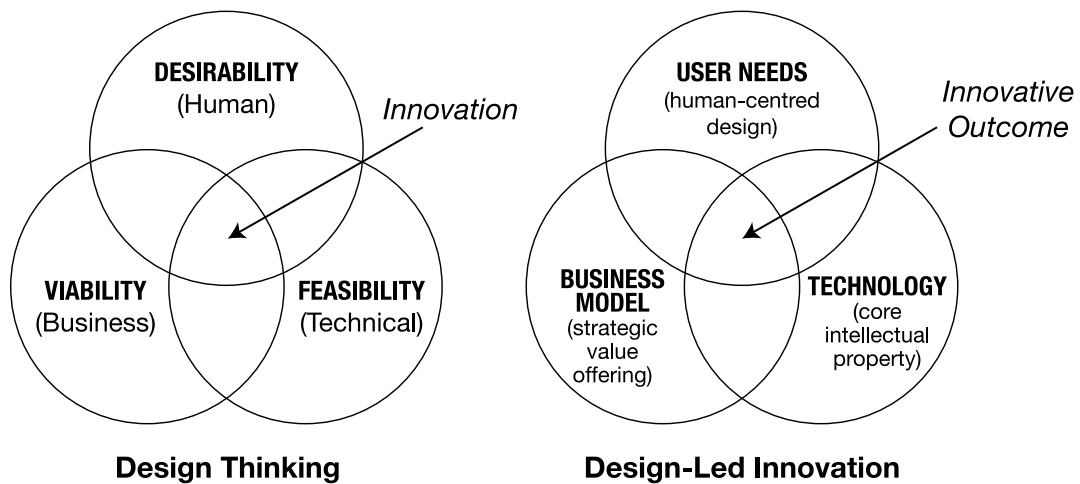
Figure 2: The Design Thinking model on the left (Brown, 2009; IDEO, 2019) *and the Design-Led Innovation model* (Bucolo et al., 2012; Wrigley, 2017) *on the right, adapted from Wrigley (2017, p.236)*
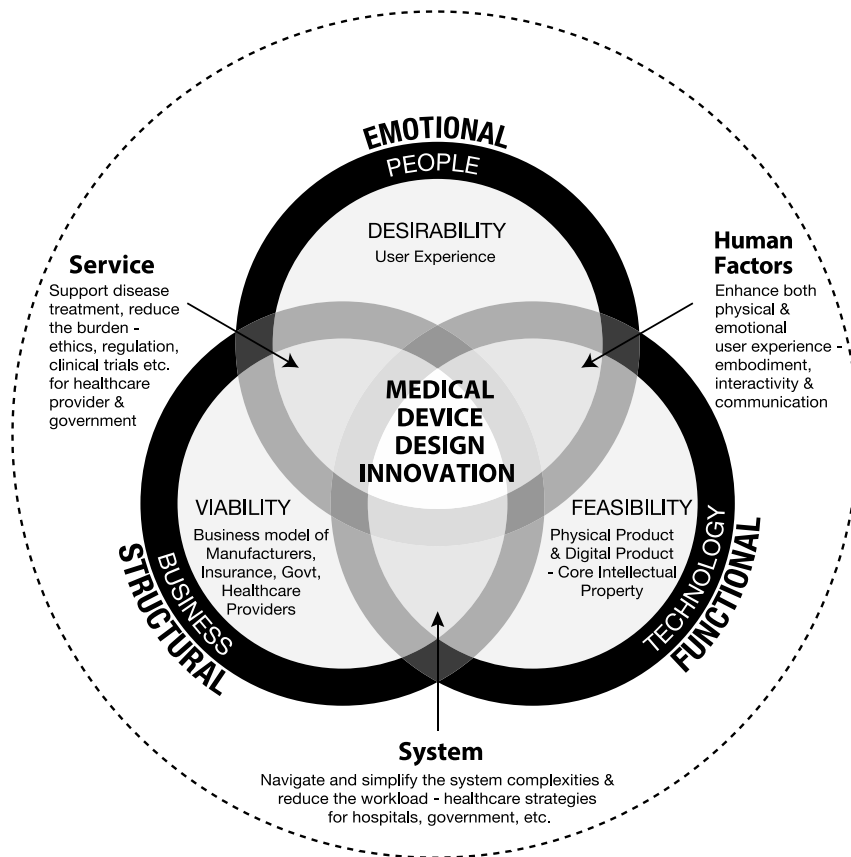
Figure 3: Design Innovation Framework for Medical Devices

The MDDI conceptual model has also been inspired by the authors' understanding of Product Service Systems (PSS) (Manzini & Vezzoli, 2003; Tukker, 2004, 2015; Wallin, Parida, & Isaksson, 2015). Each of the segments in the framework corresponds to a key element of a proposed design innovation approach as it applies specifically to the design and development of medical devices within the context of a highly complex field. The MDDI model provides a conceptual map for each of the key factors that must be considered at the scoping phase and throughout the development process for an innovative design-led intervention within the field of medical devices. Careful consideration of each segment ensures that requirements for design innovation can be met. The order of exploring each segment is not critical, but all must be examined in depth at the early stages of design to inform the design innovation process and to successfully apply the model.

Emotional – Desirability (People)

Understanding and meeting users' emotional needs is the core value of this segment, achieved through eliciting deep customer insights and then designing for them. The holistic user experience of a medical device is integral to the Emotional segment of the framework. Here, latent user needs can be addressed through stakeholder engagement and human-centred design research methods that are directed at discovering tacit knowledge and users' key emotional needs. Here, we ask: who are the key users? Are we solving the right pain points for each of the key users (whether directly or indirectly involved)? Indirectly involved stakeholders' needs might influence the outcome of design. This segment situates design aesthetics, industrial design, user experience design, and interactions, and how user groups experience a medical device through a series of touchpoints throughout their treatment journey. Opportunities are identified here to design emotional user experiences via new products, services and systems that are driven by desirability.

Functional – Feasibility (Technology)

The core intellectual property – i.e., the functional foundation of how a device works to successfully provide disease treatment resides in this segment. Feasibility is borne of appropriate selection and implementation of technology. Technological development represents the ability to manifest a desired user experience through both physical and digital means. Technology development represents the greatest potential for risk due to factors such as manufacturing process constraints, cost drivers, or biocompatibility of materials, but is also currently the most significant industry driver in medical devices. However, in this framework, technology must be reframed as an enabler of user experience rather than a singular driver of innovation potential. Technological advances fall under the Functional segment, where it is essential to determine whether the technology currently exists to accomplish what users genuinely need. If not, whether the technology can be feasibly developed within a reasonable cost and timeframe needs to be determined. Here, we build on the strengths of current and core operational capabilities.

Structural – Viability (Business)

The Structural segment encompasses the wider ecosystem of manufacturers, insurance companies, governments and healthcare providers (such as hospitals). The medical device regulatory environment and FDA requirements (the 'ticket to play' in the Medical Devices industry) are also situated into a stakeholder structure within this segment and herein lies the economic value and value chain delivered by medical devices. Building globally competitive, viable and sustainable business models is imperative, whilst balancing the complex ecosystem of stakeholders (i.e. customers and payors), which collectively form a piece of the structural puzzle. In this segment, it is necessary to consider both the long-term and short-term horizons of growth. This segment is responsible for building the infrastructure to support the holistic user experience of a medical device, and the services and systems that resolve their needs.

Human Factors (Functional + Emotional)

This segment of the MDDI framework encompasses an understanding of human behaviour interactions involved with product experience both directly (tangible) and indirectly (intangible). The goal of this segment is to enhance both physical and emotional user experience through embodiment, interactivity and communication. Through human factors, optimum usability is created when both physical and psychological human capability and limitations are designed into the user experience, hence the importance of achieving an understanding of the holistic user experience when designing any product, but especially medical devices.

Evans and Geiselhart (2012) identified a number of usability factors which may influence an individual's product experience that should be considered when designing medical devices and their associated systems, including: (1) physical abilities, i.e., anthropometry, biomechanics and sensory abilities; (2) cognitive abilities, i.e., how the brain processes information and learn new things, memory, and habits; (3) state of being, i.e., the general health of users, disease states and comorbidities that challenge patients' mental and emotional states, and motivation for learning new things; and (4) experiences, i.e., educational backgrounds, and skills that will guide behavioural interactions. Moreover, environmental factors such as physical environment and life circumstances need to be considered as these encourage or discourage usability and influence overall user experiences.

Service (Emotional + Structural)

The service segment is intended to provide an intangible service in order to fulfil specific customer or user needs through an intertwined web of stakeholder groups and user touch points throughout the treatment journey, ensuring device users are consistently engaged, educated, managed and supported. Patient experience improves more holistically through thoughtfully designed services which include disease treatment support and aims to reduce the burden of treatment as well as enhance the user experience throughout the patient journey. Here, we could explore better ways to recruit for clinical trials, explore ethics, determine candidacy for treatment and regulations that meet the altering requirements for the healthcare provider and government which in turn may add economic value through extended product lifespan and services. In this segment, marketing and sales channels may reside, as well as product lifecycle, replacement schedules and device maintenance, diagnostic pathways, and patient, practitioner and caregiver training and support.

System (Structural + Functional)

Medical device innovation encompasses many different sectors' and stakeholders' involvement. In addition, the 'invisible' underlying system that supports a commercially and clinically successful medical device may not be explicitly recognised for its significant contribution to innovation. The design influence of such invisible systems may not normally be prioritised. However, a well-considered system may support balancing the complexity of many different sectors' and stakeholder's needs and holistically sustain dialogues between these groups. Examples of the system include healthcare structures and strategies which may support building unique relationships with users. This, in turn, may enhance their loyalty and increase efficiency gains throughout the whole medical treatment life cycle by fulfilling stakeholders needs in an integrated and customised way. Consequently, the workload is reduced, and the value of a business is improved. In many cases, the system workflow is rendered invisible in the delivery of digital and physical products and services – the MDDI framework on the other hand, emphasises system workflow and makes it visible.

Case Studies

The Medical Device Design Innovation framework (see *Figure 3*) is explored further through two case studies representing the extremes in medical device classifications currently undertaking a design approach to innovation. These case studies include the Ankle-Foot Orthosis (AFO) and Ventricular Assist Device (VAD), which are Class I and III respectively.

Case Study 1 – Ankle Foot Orthosis (AFO)

Ankle-foot orthoses (AFOs) are thermoplastic braces that support the foot and ankle to compensate for weakness, correct deformities and improve walking ability. These devices are a highly effective non-surgical treatment for patients with walking difficulties, such as cerebral palsy (Wingstrand, Hägglund, & Rodby-Bousquet, 2014), inherited neuropathy (Scheffers, Hiller, Refshauge, & Burns, 2012), and brain and spinal cord injuries (Vogel, Mendoza, Schottler, Chlan, & Anderson, 2007). AFOs improve mobility, maintain surgical correction and prevent recurrence of deformities (Dickinson et al., 2007; Skaaret, Steen, Terjesen, & Holm, 2019). Like other Class I devices, such as bedpans and enema kits, AFOs have undergone minimal change in experiential design, focusing only on function development. The technology surrounding the field has continued evolving, but fabrication of the same designs using traditional, manually laborious, handcrafted methods has continued to proliferate in the field.

The project focuses on patient perspectives of AFOs and design innovation to facilitate the creation of patient-centric designs and improve the qualitative and experiential aspects of paediatric patient wellbeing. The need arises from the lack of AFO development beyond technical adjustments, and dissatisfaction elucidated by preliminary research into patient perspectives – highlighting opportunity for improvement not only in the functional aspects of the device, but also the experience surrounding it. The aim is to explore the process of prescribing, producing, acquiring, and using an AFO to understand how the design and production of AFOs can be innovated to improve patient outcomes.
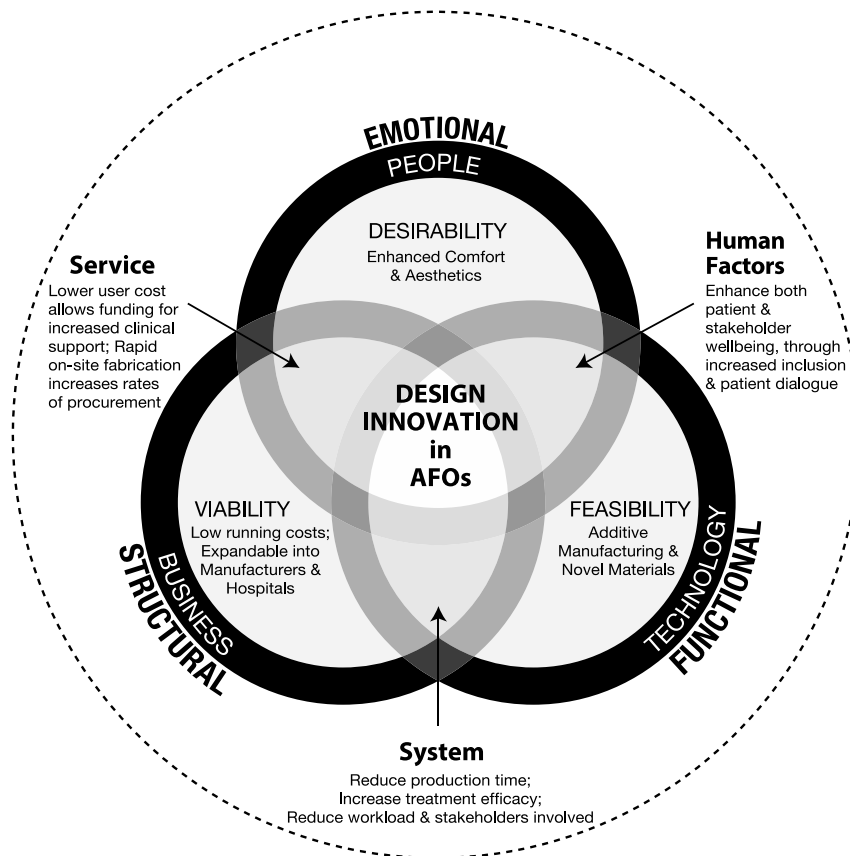
Figure 4: Design Innovation Framework for Ankle-Foot Orthoses

Emotional – Desirability (People)

Recognising the importance of emotional attachment and the capability of design innovation to promote patient-product connection is critical for long term treatment. AFO design considerations cannot be isolated to just those of the patient. Initial research suggests the value of indirect stakeholders (such as parents, carers and orthotic practitioners) in providing compelling insights into AFO design. The Emotional segment encompasses processes that will uncover experiential needs of all stakeholders, both active and latent. Human-centred approaches to design (emotional, aesthetic and functional) will generate novel and custom designs. In the context of a specific group of users - for example paediatric patients - this may foster greater attachment towards their AFO device through personalisation and comfort profiles. The manufacturing of such designs is feasible using additive manufacturing and a streamlined acquisition process.

Functional – Feasibility (Technology)

The primary technological shifts in the industry of AFOs surround the development of biometric analysis tools and similar testing facilities, but very little in the development of the AFO itself (Lai et al., 2010). Prior to the introduction and use of Polypropylene, development of AFO design spans from semi-permanent plaster casts to a metal and leather construction (Wronksi, 2019). Though polypropylene is now the industry standard, that technological shift continues with additive manufacturing. In the past 20 years additive manufacturing technologies (including 3D modelling software, 3D printers, materials and scanners) have emerged from technological infancy and present numerous advantages in manufacturing. Fortunately, the cost of this equipment has made public and private access financially less inhibitive (Wohlers & Gornet, 2014). Costs have reached a tipping point where price no longer inhibits procurement for both the orthotist/practitioners and the recipient patients, allowing for widespread adoption of this new process in lieu of the traditional methods of fabrication. Of the few relevant studies found investigating additive manufacturing in AFO development (Cha et al., 2017; Faustini, Neptune, Crawford, & Stanhope, 2008; Jin, He, & Shih, 2016; Mavroidis et al., 2011) the overall design language and geometry of the AFO is merely replicated, showing little to no sign of innovation. A systematic review was conducted by Wojciechowski et al., (2019) and concluded similarly, that

though additive manufacturing of AFO is being studied, it is an underdeveloped area lacking substantiative research. This is unlike, for example, 3D printed bicycle frames, such as a stainless-steel bike produced by Tu Delft and MX3D, that demonstrate innovation in creating mesh-like designs that do away with a solid homogenous structure. Despite this, additive manufacturing capability and technologies are an apt tool that can be utilised through the design innovation approach, since the technology offers wide variation to accommodate many differing patient preferences identified in the study.

However, technological advances alone do not produce a set of design solutions. Through design innovation, open channels of collaboration, patient contribution and orthotist involvement can develop a new model for the AFO industry, community and businesses that operate within it.

Structural – Viability (Business)

The Structural segment positions the complexities of multiple stakeholders into a framework that balances and supports their competing priorities against the regulatory demands of governing medical authorities such as the FDA. This framework presents AFO practitioners, manufacturers, healthcare providers and insurance companies with Business as a conduit through which meaningful, life-changing and engaging products can be provided. Viable business structures are conceptualised resultant from research into novel payment models, profit structures and cost effectiveness. Innovative cost models generate avenues to innovative processes, for example additive manufacturing. The automated processes associated with additive manufacturing allow for a significant reduction in human labour hours, thus reducing operational costs in the long term, despite initial setup costs being higher i.e.: the purchase of a production grade 3D printer. Lower business costs result in lower costs to users, and decreased waiting time can increase patient satisfaction (corroborated by initial research). Timely AFO replacement increases clinical efficiency. This fosters a patient-centric business model. The adaptive nature of additive manufacturing also lends itself to the regulatory environment, with sudden changes to industry standards or regulations having less of a detrimental impact on manufacturing. Most anticipated changes can be accounted for with a material or geometry change.

Human Factors (Functional + Emotional)

Much of the literature surrounding AFO development, testing and use explores aspects of function, mechanical improvement, and biometric analysis with patients (Faustini et al., 2008; Lai et al., 2010; Lam, Leong, Li, Hu, & Lu, 2005; Ploeger et al., 2007). However, the MDDI model combines both Functional (technology) and Emotional (experience) factors of a product. The model identifies a void of substantial emotional experience qualitative data in the body of AFO research of AFOs. Design innovation highlights this deficiency as an opportunity for improvement of human factors and provides tools to remedy this. Initial research into patient perspectives of published literature and secondary data such online platforms (blogs, message boards, and support forums) form an extensive understanding of the opportunities associated the pragmatic and experiential aspects of using an AFO. Categorisation Matrixes and the use of qualitative data analysis software NVivo will transform the data points into thematic clusters. This is the basis for forming design recommendations and one of the methods utilised by design innovation (Joffe & Yardley, 2003)

Service (Emotional + Structural)

Service encapsulates the intangible experiences and circumstances surrounding a product and system. In the context of AFOs, the Service segment focuses on improving the procurement and acquisition process, appointment scheduling, professional training and communication between face-to-face interactions. This is of particularly importance in paediatric patients (whom initial research indicates may require up to 3 devices of increasing size per year during childhood, depending on growth). By directly addressing patient wellbeing as a priority, new spaces for product services are revealed. Utilising design innovation methods within this space could generate, for example, a patient-facing front end that could be a way that users could engage with and stay connected with their AFO, orthotist and a larger community of users. A combination of design with additive manufacturing technology can fulfil just that.

System (Structural + Functional)

Despite being a Class I medical device, the complexity of stakeholder experiences does not diminish. Preliminary research into qualitative patient feedback establishes a need for clear, ongoing relationships between the patients and all other stakeholders in the system. The desired value of the patient is an AFO that is delivered in a timely and accurate manner; a result that can be propagated by the inclusion of novel

Structural approaches, (such as patient-centric business model) and, Functional approaches (such as additive manufacturing). A combination of these two aspects forms the System segment and can resolve many of the detractions present in the systems surrounding Class 1 devices.

Case Study 2 - Ventricular Assist Device (VAD)

A Ventricular Assist Device (VAD) is a mechanical pump that takes over the pumping function of the heart as an alternative treatment to transplantation for patients diagnosed with end-stage heart failure. VADs support patients while they are waiting for a future donor organ transplant (Bunzel, Laederach-Hofmann, Wieselthaler, Roethy, & Wolner, 2007; Jakovljevic et al., 2014) or when they are ineligible for transplant surgery (Boling, Hart, Okoli, & Halcomb, 2015; Jakovljevic et al., 2017; Kaan, Young, Cockell, & Mackay, 2010; Makdisi, Makdisi, & Bittner, 2017; McLarty, 2015; Prinzing et al., 2016; van Manen, 2017). The user experience of Ventricular Assist Devices is still far less than ideal, which in turn affects the patient's, and their caregiver's, quality of life (Friedman & McMahon, 2014; Kaan et al., 2010; Schlöglhofer & Schima, 2018). VADs place a number of limitations on their users (e.g., ordinary daily activities such as showering, exercising, driving and sleeping are impacted). In addition to the implanted VAD pump, there are a number of additional external wearable components that require constant monitoring and maintenance to ensure proper function, including the controller and external battery pack. These are connected to the pump via a driveline that extends from the internal VAD through an exit site on the patient's abdomen. In addition to their overarching condition of heart failure all VAD patients have a risk of suffering from blood clotting, stroke, bleeding, infection, organ malfunction, device failure, and right heart failure (Schumer, Black, Monreal, & Slaughter, 2016; Starling, 2010) as a result of VAD treatment, which increases emotional impact on both patients and caregivers. While innovation through technology push and incremental market pull has been observed, the translation of deep user needs into innovative new user experiences is an emerging frontier in VADs.
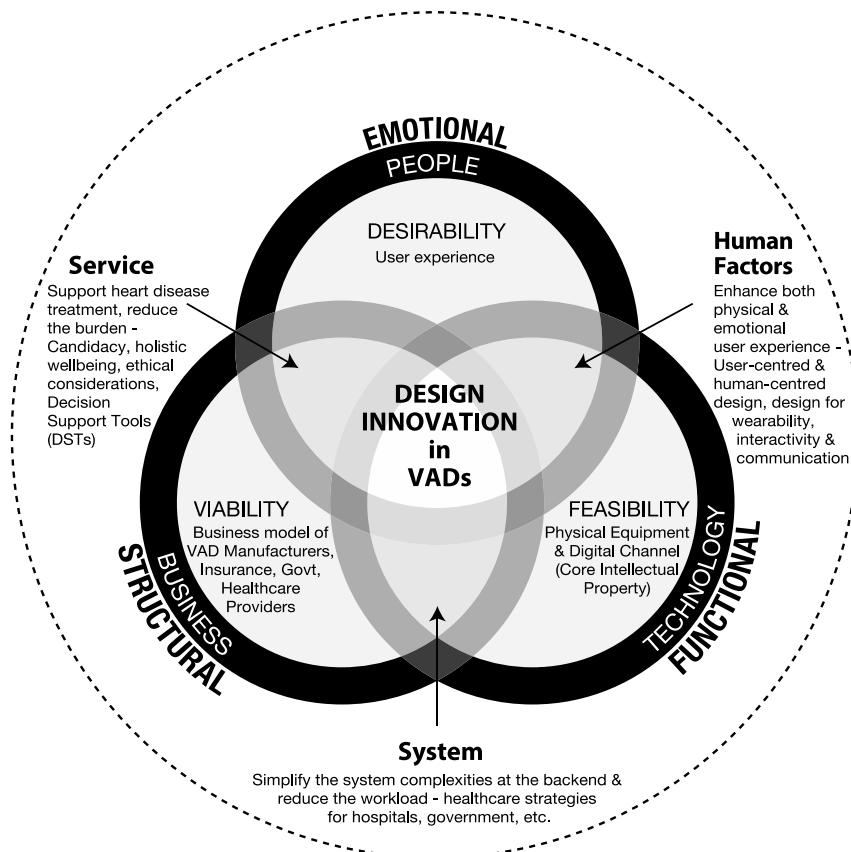
Figure 5: Design Innovation Framework for Ventricular Assist Devices

Emotional – Desirability (People)

There are a several key user groups (i.e. patients, caregivers and practitioners) to consider when designing for VAD treatment. In the Emotional segment, research will use a design innovation approach and practice to elicit authentic user stories of Ventricular Assist Devices in order to define the key needs of the three user groups

above and translate, through design, these user desires into tangible and intangible innovations in the Human Factors, Service and System segments. This segment encompasses user-centred design, human-centred design, product form and function and emotional design, and may explore VAD digital channel interactivity and communication, or develop and use novel tools to determine emotional user experience of VADs.

Functional – Feasibility (Technology)

Currently the VAD industry is technology-development driven and engineering-centric. In the Functional segment, technology must be reframed as an enabler of innovation in VADs, not the driver. Regardless, the underlying technology of any VAD innovation must work with reliability and efficacy but does not necessarily have to be completely reinvented. Feasibility of both the physical equipment and a digital platform that includes any core technological expertise in the form of core intellectual property is situated in this segment. Future technology development for VADs should be prioritised according to deep insights on emotional user needs, instead of user needs being served on the basis of technology capabilities and limitations.

Structural – Viability (Business)

In the Structural segment, a viable business model for VAD manufacturers, insurance companies, government funding, and healthcare providers (including VAD hospitals) is considered imperative. Here, business is championed as an enabler of innovation that brings life-sustaining value to heart failure patients and their caregivers, through cost effectiveness, profit structures, and payment models involving e.g. research funding, government, Medicare, insurance companies, co-pay. This segment recognises and situates the weight of the medical device regulatory environment and FDA requirements into a stakeholder structure involving VAD manufacturers, VAD hospitals, research organizations etc. Alternative business and/or industry structures may be conceptualised in this segment.

Human Factors (Functional + Emotional)

In the existing literature on VADs, human factors and usability is addressed from an engineering perspective looking at componentry and features, how quality of life (QoL) can be impacted and why it is important, but so far there lacks a holistic thread to tie together the integration of technology (functional) with user experience (emotional) into an innovative application of human factors that drives radical innovation of these devices – design is well-placed to do this. Key authorities in usability and the intuitive use of VADs include Geidl et al. (2009, 2011), Granegger et al. (2016), Schima et al. (2014), Schlöglhofer & Schima (2018), and Throckmorton, Patel-Raman, Fox, & Bass (2016), however thus far, human factors is still considered quite late in the product development process. The research team proposes to use human factors principles to drive innovation by incorporating 'Design for Wearability' guidelines for wearable VAD equipment, and by improving communication and interactivity of a digital support channel.

Service (Emotional + Structural)

This segment situates services to support heart disease treatment and reduce treatment burden. It may encompass ways to improve the patient experience such as better clinical trial recruitment, more holistic view of the patient experience from a wellbeing lens, product delivered as a service (e.g. subscription to pump and peripherals, upgradability). This segment provides the space to consider ethical considerations, including device candidacy and Decision Support Tools (DSTs) and develop user-centred services such as dedicated digital channels/platforms and self-care support tools (Ko et al., 2018). Treatment pathways such as destination therapy vs. bridge-to-transplant, alternative business and service models, and propositions of shared value may be explored here.

System (Structural + Functional)

In the System segment there is a may be a need to simplify existing complexities that exist at the backend of VAD product development, regulation, marketing, technological device support systems, and to improve or create networks and interactivity between device (the technology) and the receiver of revenue (the business) in order to deliver the desired value to the customer and patient. This segment situates strategic healthcare systems that may have implications for the broader scope of heart failure treatment pathways via healthcare strategies for hospitals and governments, for example.

Medical Design Innovation Constraints

The MDDI framework illustrates the applicability across the two extremes of Class I and Class III medical devices. The similarities include a need to meet general requirements of all medical devices. However, clear differences between a Class I and a Class III device arise in the increasing difficulty of translating a desirable user experience under immense technical complexity in the context of a more rigid structural environment with stacked constraints that must be navigated in order to achieve an innovative outcome.

Where design does play a role in the development of medical devices, the role is often pragmatic, business centric and/or inward facing – focusing on aspects such as cost-effectiveness (for the business), risk reduction, market placement and regulatory requirements (Medina, Kremer, & Wysk, 2013). An understanding of the role of design and need for design innovation in the field of medical device product development is scant in the wider academic literature, especially in the field of life-saving medical devices. Where design exists, there are many obstacles that distract from a user- or patient-centric innovation model. These obstacles have been attributed to the heavily restrictive influence of FDA requirements, reported as "the first external factor affecting a company's ability to develop new medical technology and influencing a company's product development priorities" (Medina et al., 2013). Such requirements exist for a compelling reason to protect patient safety and reduce the risk of adverse outcomes. Thus, design innovation faces unique requirements, constraints and challenges in the field of medical device design that are unlike any other in consumer product development. Herein lies the opportunity for the framework to yield its contribution (as detailed in *Table 2*).

Table 2: FDA Regulatory Requirements for Medical Devices as they align to the Medical Devices Design Innovation framework – Class III includes requirements listed in Class I and II, Class II also includes all requirements listed in Class I

	Class I	*Class II*	*Class III*
EMOTIONAL – Desirability (People)	--	--	--
Human Factors (Functional + Emotional)	Records and reports	Postmarket surveillance	Clinical investigations data
FUNCTIONAL – Feasibility (Technology)	Good Manufacturing Practices	Performance standards	Technical data Non-clinical laboratory studies data
Service (Emotional + Structural)	Notification and repair, replacement, and refund	Patient registries	--
STRUCTURAL – Viability (Business)	Device registration and listing	Special labelling requirements 510(k) – Premarket Notification showing substantial equivalence	Premarket Approval (PMA); or, if exempt: 510(k) – Premarket Notification showing substantial equivalence
System (Structural + Functional)	Adulteration Misbranding Banned devices Restricted devices	Guidelines Premarket data requirements	--

Conclusion

This study explores the role of design in medical device innovation and introduces the MMDI framework as a way to innovate in medical device product development through using a design innovation approach that has been proven successful in other industries. Two case studies are detailed, with the findings presented suggesting that the MDDI framework is applicable to the wide range of medical devices available from Class I through to Class III. While this study does not offer a conclusive answer to the question of how a design

innovation approach can be best applied to medical device product development to guarantee innovation, it does suggest a new way to navigate the nuances and complexities of the medical device industry from early-end device development through to product launch, in order to better balance user needs with commercial viability.

It is possible, in exploring the Medical Device Design Innovation framework, that learnings could be extrapolated to the wider field of healthcare or health services design that are intrinsically interconnected with medical devices or rely on medical devices to supply care, in order to identify new opportunities for innovation. One example might be for surgical training tools, which exist in the medical education field but may not necessarily be classified as medical devices. The authors acknowledge the shortcomings of this publication in that the Medical Device Design Innovation framework has been exemplified and tested on only two case studies, and this does not yet allow us to validate the model in the vastness and variety of available medical devices.

The Medical Device Design Innovation framework is conceptual in nature and thus requires further exploration in future studies. From the perspective of the VAD and AFO case studies, future research will test the Medical Device Design Innovation framework as a catalyst for driving design innovation in each of these two devices. The framework will be used to assess how novel design proposals for each of these devices fit into a wider innovation context for medical devices in general. Further research is also needed to compare the official FDA Device Development Process (U.S. Food & Drug Administration, 2018a) to actual design-led innovation success stories whereby innovative ideas are nurtured from early-stage research through to product development, manufacture, launch, adoption, and hopefully widespread use and success in the marketplace. There currently exists insufficient research on non-designers who practice design in the field of medical device product development, and there is limited research on the role played by trained designers in medical device design – the work of Mary-Beth Privitera leads the way in this field (Privitera, 2015, 2017; Privitera et al., 2015; Weinger, Gardner-Bonneau, & Wiklund, 2011). Qualitative studies are needed to understand how medical device manufacturers are innovating by borrowing and adapting design methods tools, practices, and processes such as IDEO models (Kelley, 2016), design thinking, design-led innovation, agile, user-centred design, the double-diamond framework, UI/UX design, etc. and how designers are working in multidisciplinary, cross-functional teams. To make a stronger case for design innovation, there needs to be greater understanding from the field regarding how structural constraints (e.g. marketing, FDA requirements, or insurance reimbursement schemes) hinder innovation of medical devices. Research is needed that explores how traditional market research or 'Voice of the Customer' could be stifling innovation in medical device design by simply seeking to prove assumptions and not to deeply understand the relationship between the function of a device and the emotional experience of such a device; that is, asking customers what they want, rather than why they want it (Price, Wrigley, & Straker, 2015). Similarly, further research is needed to determine if and how the FDA 510(k) and similar processes worldwide could be inhibiting medical device innovation processes and endangering patients by making it easier for manufacturers to base a product's design and safety case on a predicate product rather than create a novel invention that would require a PMA, significant investment, clinical trial before launch, and risk mitigation (Fargen et al., 2013). Additionally, research is needed on how the structural conditions of doing business with medical insurers may mean that manufacturers are incentivised to comply to existing insurance reimbursement codes based on older product configurations which also hampers innovation since better products don't get made for patients because then those products wouldn't be reimbursed, thus would not sell. Finally, the Medical Device Design Innovation framework could be tested in-house with a range of medical device manufacturers to further refine and improve upon the conceptual proposal.

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Gaining patient experience insights: an integrated and multi-leveled framework of information

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Taking patient experience as a basis, this paper introduces a theoretical framework, to capture insights leading to new technological healthcare solutions. Targeting a recently diagnosed type 1 diabetes child and her mother (the principal caregiver), the framework showed its potential with effective identification of meaningful insights in a generative session. The framework is based on the patient experience across the continuum of care. It identifies insights from the patient perspective: capturing patients´ emotional and cognitive responses, understanding agents involved in patient experience, uncovering pain moments, identifying their root causes, and/or prioritizing actions for improvement. The framework deepens understanding of the patient experience by providing an integrated and multi-leveled structure to assist designers to (a) empathise with the patient and the caregiver throughout the continuum of care, (b) understand the interdependencies around the patient and different agents and (c) reveal insights at the interaction level.

Keywords: patient experience, experience design, framework, insights, chronic patient

Introduction

With an increasing life expectancy, healthcare systems around the world have had to evolve to meet several challenges. In the previous century, healthcare was mainly oriented towards reacting to acute pathologies where the focus was to address urgent issues. In recent decades, however, the pattern of pathologies has undergone significant change, with an increase of chronic conditions putting unprecedented stress on healthcare systems (Institute of Medicine, 2001; World Health Organization, 2005).

Chronic diseases are also known as noncommunicable diseases, and include cardiovascular diseases, cancers, chronic respiratory diseases, diabetes or dementia. All these diseases have common characteristics, such as their long duration or their usual non-curable condition. The differences between acute pathologies and chronic diseases are changing the way the healthcare system needs to respond, introducing the concept of a continuum of care (World Health Organization, 2018).

The continuum approach has led to an emerging concept in the healthcare sector: the patient experience. Patient experience refers to the range of interactions that patients have with the different agents of care, such as doctors, nurses and hospital staff, medical consultations, health plans and other medical care facilities. Nowadays, patient experience is regarded as a central outcome for many national health systems (Purcărea, 2016).

In this context, technological solutions are contributing to a wide range of opportunities to improve the patient experience (Andreu-Perez, Leff, Ip, & Yang, 2015). Providing a more personalized, safer, timely,

efficient and effective experience is becoming a central challenge for the healthcare system (Berwick, Nolan, & Whittington, 2008; Institute of Medicine, 2001).

This approach locates the patient experience in a central position when designing new medical products and solutions (Wechsler, 2018). Such technological solutions can keep patients on the radar and monitor their adherence to treatment, for example.

Altman, Huang and Breland, (2018) made a systematic review of patient centred solution design concluding that there is an inconsistent use of methodologies. They highlighted the need to develop new methods that effectively integrate the most useful components for the healthcare sector. The use of a structured approach to generate new products and solutions with a patient centred approach may be a key factor in their success. Therefore, there is a need to create specific methods and tools for the healthcare sector that help designers design new solutions that take the patient experience as a reference.

While design is a process with different stages (Roozenburg & Cross, 1991), the entire design process is based on identifying meaningful insights that have the capacity to lead to successful new solutions (Caulliraux & Meiriño, 2015). One of the most effective ways to capture such insights is to focus on the customer experience. This is important because it (1) takes the customer perspective, (2) identifies root causes, (3) uncovers at-risk segments, (4) captures emotional and cognitive responses of customers, (5) spots and prevents decreasing sales, and (6) prioritizes actions to improve (Mccoll-Kennedy et al., 2017; McColl-Kennedy, Zaki, Lemon, Urmetzer, & Neely, 2019). Applying this approach to the healthcare sector, we can focus on capturing insights based on the patient experience with the aim of developing new products and solutions.

This paper presents a framework that enables the identification of meaningful insights based on the patient experience, leading to new products and technological solutions for the healthcare sector.

The framework is based on a literature review of the field of the patient experience. First, we explore the common guiding principles of patient experience, and develop a theoretical framework that integrates different levels of information for capturing meaningful insights. Second, the framework is presented highlighting its potential for empathising, understanding and revealing relevant insights for innovation. Finally, we explore empirically the potential of the framework in a real case study and guide the steps for future research.

Patient experience

Patient experience is a broad and emerging concept. Therefore, its definition is still evolving. The Beryl Institute defines the patient experience as the "sum of all interactions, shaped by an organization's culture, that influence patient perceptions, across the continuum of care" (J. Wolf, Niederhauser, Marshburn, & LaVela, 2014).

Many authors agree with the "guiding principles" underlined by the Beryl Institute (Purcărea, 2016) such as: engaging all voices in driving comprehensive systemic and lasting solutions; looking beyond clinical experience of care to all interactions and touchpoints; focusing on alignment across all segments of the continuum and the spaces in between; and encompassing both a focus on healing and a commitment to well-being (Silvera, Haun, & Wolf, 2017).

Following this early concept, some authors are rethinking the term patient too. Is it fair to talk about a person with a chronic condition as a patient, knowing that she or he will never be "healthy"? Is it fair to call a patient someone who simply wants to achieve a better state of health? Jones (2013) introduces the term "health seeker": the health seeker is any person aware of his or her motivation to improve his or her health, whether sick or not. Health seeking is the natural pursuit of one's appropriate balance of well-being.

Therefore, we define patient experience as the sum of numerous multi-agent interactions particularly emotional, as a consequence of the pursuit of health and well-being along the continuum of care, whether sick or not.

Patient experience as a continuum

Patient experience is not just one encounter, but occurs over time and includes many touchpoints; and it is considered as the continuum of care (J. A. Wolf, Niederhauser, Marshburn, & LaVela, 2014). While the patient

experience is built upon diachronic interactions led by different agents and organizations, no agent can oversee the experience like the patient does (Ben-Tovim, Dougherty, O'Connell, & McGrath, 2008).

The patient is the system element that draws a path along the touchpoints; the one who connects all the interactions creating a unique and unbreakable bond, mapping a journey through the continuum of care. These journeys are contingent upon patient needs and the agents involved (Evashwick C., 2005).

The continuum of care has been taken as an axis by different authors in the healthcare discipline, especially when talking about chronic diseases. Batalden et al., (2016) emphasized the idea that the continuum of care for chronic patients goes far beyond mere clinical factors. Patients, seen as co-producers of their own care and attention, live their journey as a continuum, integrating different areas in the healthcare system and other agents present in their life (Figure 1).

The chronic continuum of care leads us to visualize these journeys as more continuous over time and not only based on clinical interactions. Other interactions outside the medical domain are also part of the continuum; for example, tasks related to care or proper adherence to the treatment (Bengoa, 2014) (Figure 1).
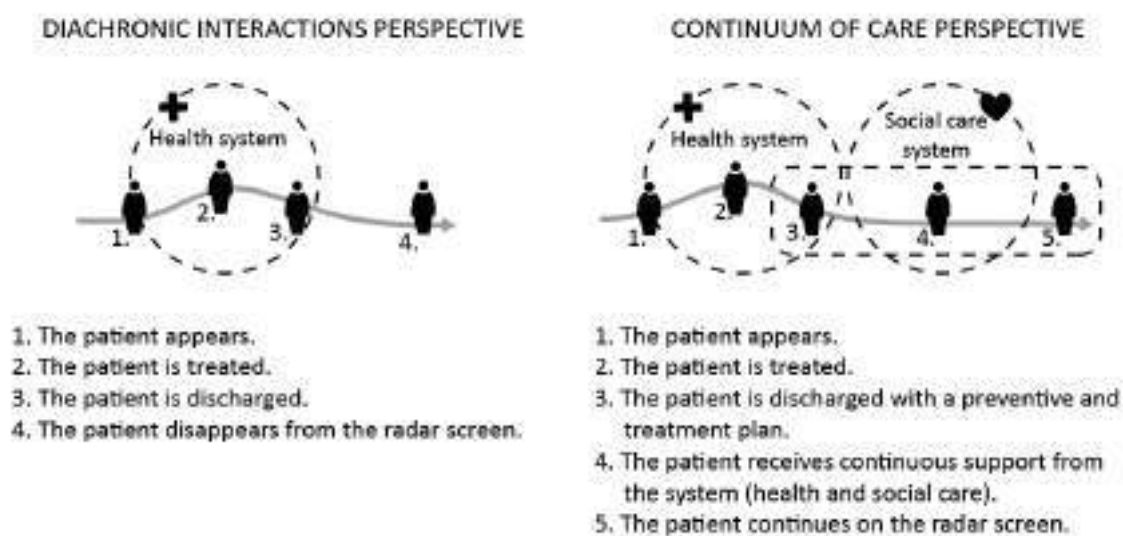
Figure 1: Differences in the patient experience between diachronic interactions and the continuum of care perspective (adapted from Bengoa (2014) and Batalden et al. (2016))

Patient experience as an emotional process

Emotions in patient experience are more relevant than in any other context. Generally speaking, negative emotions are the prevailing trend in the continuum of care (Caulliraux & Meiriño, 2015). These heightened emotions are elicited due to the threat of losing valued resources, such as well-being, money or time that patients experience. Any threat to these resources is, essentially, a trigger event that gives rise to emotion elicitation (Mccoll-Kennedy et al., 2017).

Chronic diseases appear in an unwanted way: they emerge suddenly in people lives as game changers. Valuable resources such as quality of life, mobility, or similar are threatened by a diagnosis. This creates a dichotomy in the experience, defining a before and after the illness. It has been shown that people who suffer a change derived from a disease, such as diabetes (Isla, Vasallo, Guasch, & Rabasa, 2008), undergo a transition process that may correspond to the psychological stages of grief (Afonso & Minayo, 2013; Kübler-Ross, 1969).

When facing the new situation, patients and family members experience intense emotional reactions throughout the continuum. Those encounters that are especially critical for the patient are commonly known as moments of truth or pain moments (Figure 2). These moments have a more significant influence on experience outcomes than any other encounter (Lemon & Verhoef, 2016). (Variables such as frequency, duration or intensity can be used to describe critical pain moments (Bitran, Ferrer, & Rocha-Oliveira, 2008; den Uijl, Jager, de Graaf, Waddell, & Kremer, 2014).

Patient experience as a multi-agent process

A chronic disease guides the patient through a continuum of care. It integrates a high number of agents, operating within healthcare systems increasingly recognised to be complex (Plsek & Greenhalgh, 2001; Sweeney, Danaher, & McColl-Kennedy, 2015). Each agent operates within a variety of systems as members of internally coordinated procedures that seek the well-being of patients (Ham, Kipping, & McLeod, 2003).

The core driver for healthcare systems should clearly be the improvement of health and the personal experience of health. The prevailing trend, however, is to use disease protocols, financial management strategies and centralised control of siloed programs to manage healthcare systems (Sturmberg, O'halloran, & Martin, 2010).

The World Health Organization described the healthcare system as organizations, people and actions whose primary intent is to promote, restore or maintain health (Musgrove et al., 2000)

This includes efforts to influence determinants of well-being as well as more direct health-improving activities. A patient is likely to draw on a network of resources that extend well beyond the focal organization to include interactions with other agents (Arnould, Price, & Malshe, 2006) such as complementary therapies, interactions with private sources such as peers, family, friends, and even other patients (Black & Gallan, 2015).

For the purposes of this research, there are three different types of agents that are regularly connected through the continuum of care, as identified by the Health Innovation Network (2013) (Figure 2):

- Healthcare, developing activities around "cure" (i.e. doctor).
- Social care, developing activities around "care" (i.e. occupational health).
- The patient ecosystem (i.e. a mother caring for a chronic child).

Healthcare providers are typically managed through policies and plans adopted by the government. The healthcare sector employs several staff working in a professional, usually hierarchical structure and orients its work to patient health following rigorous procedures (Ben-Tovim et al., 2008): doctors, nurses, midwives, paramedics, therapists, psychologists, among others.

Social care is not characterized by standardized management (Anttonen & Sipilä, 1996). It is a care-centred concept, that countenances and develops care as an activity and set of relations situated at the intersection of state, market and family and voluntary sector relations (Daly & Lewis, 2000). As a concept and activity, social care covers a number of different relationships and actors, and it is a broad concept full of different organizations: governmental, private or charitable support organisations.

The patient ecosystem (Gallan et al., 2018) refers to close and affectionate agents to the patient: relatives, friends, colleagues or neighbours. Usually the relationship that exists between the ecosystem and the patient is unpaid care, where the caregiver agent appears. Like the patient, these informal caregivers also experience emotional fluctuations that directly influence their everyday life (Carey, Tennant, Rodgers, & Dodd, 2017) (Figure 2).

Patient experience as a sum of interactions

The continuum of care is a journey for the patient. The patient goes through different encounters with different agents (healthcare, social care or the patient ecosystem) and in different contexts. As the patient moves from interaction to interaction, it is important to understand how such interactions affect the overall experience (Lemon & Verhoef, 2016). Therefore, it is important to describe in detail the ingredients of these interactions.

Each interaction can be described in terms of different factors. On the one hand, interactions can be characterized by the agents present in the encounter and on the other hand, interactions happen in specific contexts, locations and under specific circumstances (Lemon K. & Verhoef P. 2016)

According to Klapperich, Laschke, & Hassenzahl (2018), an interaction can be described with: (1) agents profile (description of the agents that take part), (2) practice (i.e. steps and activities, time-based structure that the agents follow), (3) meaning (i.e. why is this interaction meaningful for the agents?), (4) needs (i.e. which psychological needs are affecting agent wellbeing?), (5) skills (i.e. what skills do the agents use to perform the practice? has the illness affected patient abilities?) and (6) materials (which can be divided into the context or environment, and the materials that agents employ to perform the practice).

This approach is based on (Reckwitz, 2002) social practices work where any interaction consists of three highly interrelated elements: meaning (i.e., symbolic meaning, ideas, aspiration and intrinsic goals), competencies (i.e., skills, know-how and technique) and material (i.e., artefacts, tools, physical context and infrastructures). Experiences are the sum of meaningful moments created by interacting with these material arrangements.

As a conclusion, an in depth understanding of an interaction implies analysing factors related to the context and circumstances of the situation. Figure 2 describes the scope of the interaction, such as agents present in the interaction, the patient abilities and skills, psychological needs, material arrangements of objects, different touchpoints and technologies; and tasks and activities which the agents must perform to reach the goal of the interaction.
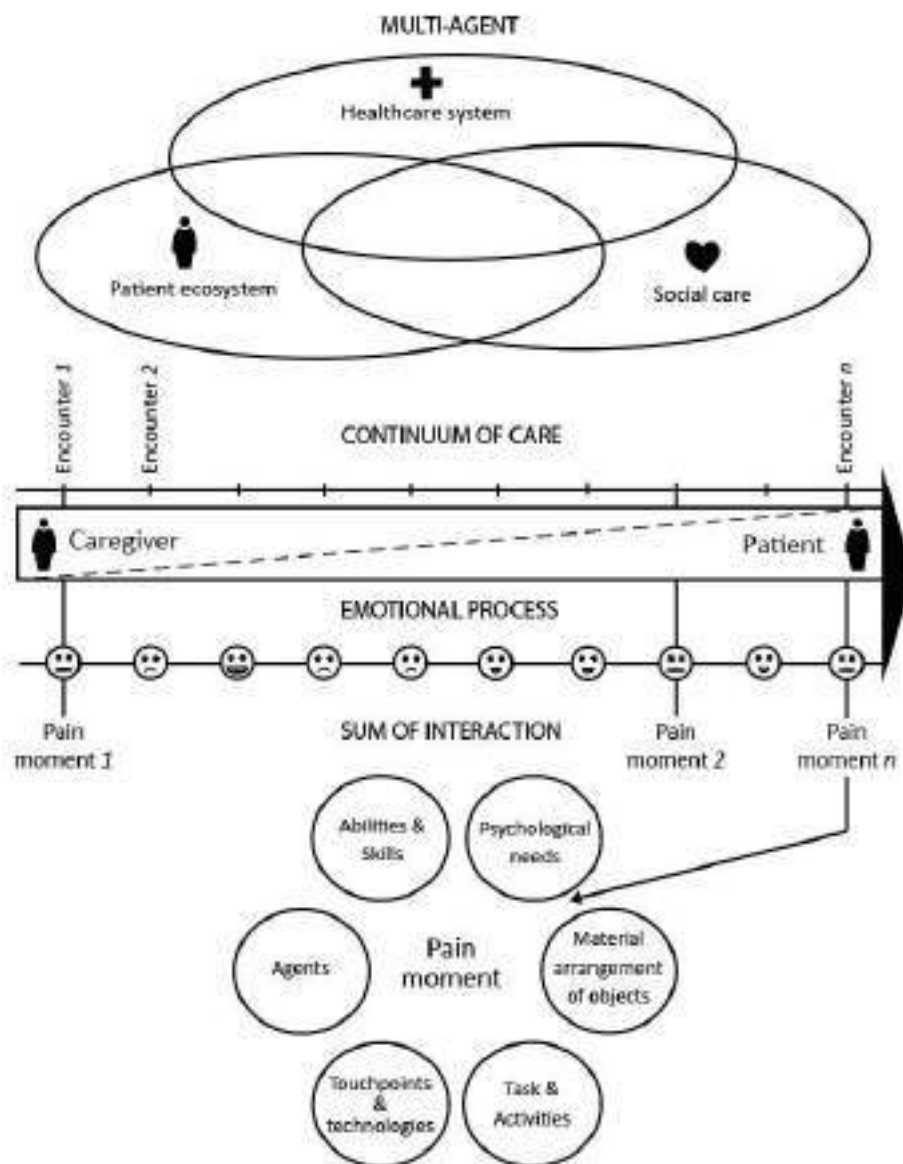
Figure 2: Patient experience features

Methodology

Based on our literature review of the patient experience, we built a theoretical framework to (1) identify significant information regarding the patient experience that enables the capture of design insights and (2) organize information in a multi-level structure to facilitate insight identification.

The framework

We developed a theoretical framework to analyse the patient experience at different levels of information: meso, macro and micro level. The integration of levelled information guided designers to identify relevant and realistic insights (Beirão, Patrício, & Fisk, 2017) revealing technological innovation opportunities that must be used to improve care (Coulter, Locock, Ziebland, & Calabrese, 2014).

Multi-level frameworks encompass different factors that enhance the understanding of an experience (Andreini, Pedeliento, Zarantonello, & Solerio, 2018). By addressing the meso, macro and micro layers of the proposed framework, we visualized the patient experience as a multi-level phenomenon; shaped by emotional, systemic and psychological forces. An integrated view of all relevant factors is needed if designers are to comprehensively understand patient experience.

Linkages between meso, macro and micro levels can guide designers when understanding the full dimension of the patient experience. These connections also provide designers with research guidance when capturing insights that might be relevant for opportunity identification in the healthcare sector (Evans, Higgins, & Hoffer Gittell, 2018; Gallan et al., 2018)

While methods are available for separately addressing each of the levels of the continuum of care (meso, macro and micro) we identified a lack of visualization tools that address the patient experience from a holistic point of view (Curry & Ham, 2010).

To this end, we developed a conceptual framework to visualize information to capture meaningful insights from the patient perspective. The three levels of information visualized in an integrated way are:

1. Meso-level information to empathise: the axis of the analysis is the patient and caregiver journey through the continuum of care. Meso-level analysis involves looking at the patient experience as the key intermediate-sized unit smaller than the healthcare system, but larger than one-to-one interactions. The journey of patients and caregivers is full of information with potential to reveal meaningful insights and opportunities. Many potential new products and solutions will target patients and caregivers themselves, making them the target user. Thus, understanding their routines, emotions and everyday activities is central to identify problems they face and to capture possible insights to solve them.

2. Macro-level information to understand: this level refers to understanding agents present in the patient experience from a system perspective and the interdependencies of how the upper systems function. Studying the largest unit is called macro-level analysis and involves looking at patient experience from a system level. Macro-level analysis is essential for designers to understand how larger system forces affect and shape the patient experience. How agents interplay with each other and how a variety of professionals support patients through the journey is key to identifying specific problems affecting the patient. These professionals may often be target users for specific solutions. An in depth understanding of their working procedures and protocols is a necessary step for revealing meaningful insights in the sector.

3. Micro-level information to reveal: taking patient and caregiver pain moments as a driver, the micro level describes these painful interactions in detail. Micro-level analysis is defined as a focus on individual or small interactions in specific situations. The micro level is important because it focuses on one-to-one interactions occurring through the continuum of the patient journey. The micro level is understood as an in-detail view of the roots of the pain moment and its nuances.

Empathising at a meso level

To empathise with the patient and the caregiver, the meso level has three main factors to be mapped: (1) focusing on the patient and the caregiver, (2) understanding their journey through the continuum of care, and (3) identifying the emotional burden for both of them (Figure 3, meso level).

An important contribution of our framework is to integrate the principal caregiver in the analysis. As the caregiver shares the journey with the patient, the patient's well-being depends largely on his support (Carey et al., 2017). Clinicians frequently overlook the caregiver burden. Identifying pain moments affecting the caregiver, which would otherwise remain hidden, (Adelman et al., 2014) may reveal significant insights that can guide the development of new products and solutions.

To start the analysis, it is important to map chronologically all the interactions that the patient is experiencing through the continuum of care. Moreover, in chronic patients it is crucial to identify those moments that are off the clinical radar. For instance, self-control and self-care moments are important moments to analyse (Telford, Kralik, & Koch, 2006).

This journey is typically characterized by high intensity emotions for both the patient and the caregiver. There are already some design tools like the Customer Journey Map that academic and practitioners use for a better understanding of the entire and chronological experience (Rosenbaum, Otalora, & Contreras Ramírez, 2016). Carey et al. (2017) visualized the patient and caregiver journey through the continuum of care, focusing on their emotions throughout the experience.

Immersive learning increases empathy and understanding of the patient experience (Halton & Cartwright, 2018). Journey mapping allows designers to empathise with the patient and the caregiver experiences to be able to identify critical pain moments throughout the continuum of care (den Uijl et al., 2014). Hendricks, Conrad, Douglas, & Mutsvangwa, (2018) highlighted deep empathy as a key aspect for a better understanding of the problem that contributes to the development of more comprehensive and effective solutions (Yoon, Desmet, & Pohlmeyer, 2013).

Understanding at a macro level

The macro-level information analysis seeks to identify the agents involved in the continuum of care, and how they interact with each other. When designing new products and technological solutions, the perspective of different agents is recognised as a core principle that facilitates the process (Hendricks et al., 2018).

On a first level of closeness to the patient, the patient ecosystem includes agents who have a personal relationship with the patient, such as relatives and friends. Unpaid care is a common feature of relationships with these agents (Gallan et al., 2018).

Typically, healthcare agents include healthcare providers that develop activities around "cure" and social care providers that focus on activities around "care". These professionals respond to their own system with their own goals and hierarchy. This means that each system has its own logic flow of information, resources and economics.

From a patient experience perspective, inefficiencies and overlapping services between agents may arise. These points can present important insights for designers when visualizing opportunities for new products and solutions.

If designers are to identify insights for new products and solutions, it is important for them to consider how these innovations will fit the current systems (Hendricks et al., 2018). Understanding what a new product or solution represents for different agents and the impact it might have on their own functioning logic is a key issue for further acceptance of the innovation within the system.

Accordingly, our framework at a macro level structures information from the healthcare system, social care and the patient ecosystem (Figure 3, macro level).

Revealing at a micro level

The micro level can easily lead to the identification of especially unpleasant interactions in the patient experience. As an example, Ternik, (2016) highlighted the importance of micro level information for effective product innovation. He explored in detail the many considerations to be factored into the design of oral drug products for elderly patients. His research showed that gaining a comprehensive understanding of patient behaviours and needs, and incorporating that knowledge into product design is crucial.

Mullaney, Pettersson, Nyholm, & Stolterman, (2012) explored how human-centred design can expand the solution space surrounding patient experience in healthcare, specifically studying patient emotions. Their findings focused on anxiety in cancer patients and investigated the situational triggers of patient anxiety within the radiotherapy treatment experience, leading to innovation spaces.

Although it is a complex and difficult endeavor, insights can arise when identifying critical interaction throughout the journey (Lemon & Verhoef, 2016). Encounters that are especially critical for the patient are commonly known as *moments of truth* or *pain moments*. Pain moments are endowed with innovative opportunity potential for designers to improve the patient experience (Figure 3) (Desmet, Fokkinga, Ozkaramanli, & Yoon, 2016).

Emotions, therefore, can be seen as elementary information for new product development (Desmet & Hekkert, 2009). A deeper understanding of patient emotions in the pain moment can help the designer to anticipate and therefore minimize the negative impact of such moments.

Every identified pain moment refers to interactions where patients respond to their psychological needs in a specific context and under specific circumstances. Patient abilities and skills play an important role when the patient goes through a certain sequence of activities or tasks to reach the objective of the interaction. Other important factors that characterize interactions are the specific material contexts, objects, technology and touchpoints and the different agents present at the interaction (Hassenzahl et al., 2012; Klapperich et al., 2018).

In this context, at a micro level, our framework integrates information about activities, context, touchpoints, agents, psychological needs and abilities of the patient following the Klapperich, Laschke, & Hassenzahl (2018) approach (Figure 3, micro-level).

The framework

Figure 3 shows the theoretical framework that integrates multi-level information from the patient experience perspective. The framework pre-structures information so that designers can capture meaningful insights for designing new products and solutions in the healthcare sector.
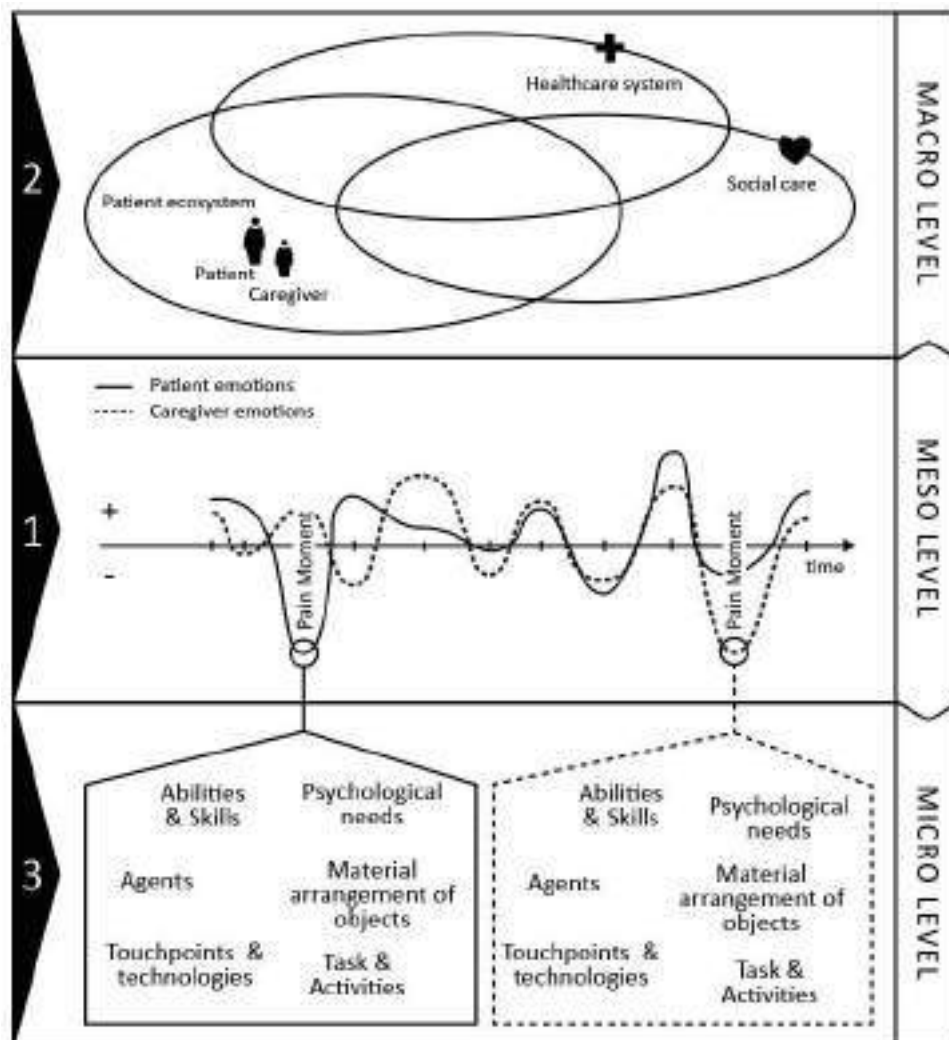
Figure 3: Theoretical integrated and multi-level framework of information

Empirical application of the framework and discussion

The empirical application of the framework targeted the case of a 10-year-old girl with a recently diagnosed Diabetes Mellitus type 1. Diabetes is a chronic disease characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycaemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs (American Diabetes Association, 2014). The correct development of the treatment for diabetes type 1 is based on the balance of insulin injection, physical activity and controlled diet.

The procedure participants used when testing the framework was: (1) interviews with both the child and her mother, (2) identifying, organizing and plotting relevant information in the framework, (3) a generative session to create ideas and (4) evaluation of the results.

We tested the framework targeting a recently diagnosed type 1 diabetes child and her mother (the principal caregiver). Participants for testing the framework were a strategic designer, a service designer, an interaction designer and a product designer. The interview took place in the Diabetes Association. The mother and the child were selected by the association, due to their active participation in different activities. The mother supports many initiatives to fight for the rights and the improvement of the quality of life of people with diabetes. The child takes part in activities, like summer camps, with other children with diabetes. They are aware of their condition and the adherence to the treatment was adequate.

Interviews with the patient and principal caregiver

The framework informed the structure of the interview script, which focused on the meso, macro and micro levels. This helped the designers to (1) extract relevant information about the journey through the disease experienced by the girl and her mother, (2) identify the participating agents on the journey and understand their function and (3) identify the most critical pain moments and elicit the specifics of the context and situation for pain moments.

The semi-structured interview was made to the mother and conducted by the strategic designer and the service designer: It took 1h. The panel interpret that the mother, as the caregiver, should know more about how the institutions operate. So the interview was more focused on a macro and meso level information gathering. The interaction designer and the product designer interviewed the child, obtaining a broader knowledge at the micro level, by taking detailed painful interactions as the focal point. Finally, a brief summary was made all together, the panel and the interviewees.

It is also important to point out the limitations of interviewing. The panel assumed that what the mother or the child said during the interview could not be the same as what they would say or do in other situation. Despite these limitations, the panel tried to create an atmosphere in which they were likely to talk freely. That is why the interviews took place at the *Diabetes Association*, a familiar place for both. In addition, the panel spent time with them in a meal routine, trying to emulate and observe their day-to-day lives to get a deeper understanding out of that encounter.

Identifying, organizing and plotting

With the analysis of the girl's ecosystem, the designers first identified that the adherence to the treatment regimen was supported by the parents, and the mother was mapped as the principal caregiver. The information provided by the girl and the mother is shown in Figure 4, at the meso level. Plotting the emotions of both of them revealed that the experienced pain moments are not the same for the girl and her mother.

For the mother, the most painful moments were those when the girl needed to manage the treatment on her own: at school or in her leisure time, for example. In contrast, the girl reported different pain moments such as routines and activities dissimilar to those of the rest of the children, or a loss of independency, for instance. The entire journey was described as arduous and overwhelming for the family.

One of the most frequent pain moments was having lunch at school (Figure 4 micro level), where the girl needed to manage her treatment. An in-depth analysis identified that the girl felt overwhelmed by the treatment requirements, and unpopular because she was different to her friends. The mother, on the other hand, worried about her daughter´s abilities to manage the treatment on her own. The treatment involved difficult tasks such as glucose control, calculating and injecting the correct insulin dose and estimating the

required number of carbohydrates to eat. Although there were some agents present in this interaction (teachers or canteen monitors), they did not have the knowledge or the responsibility to support the girl.

Designers focusing on the macro level identified different agents that appeared recurrently, for example, the endocrine doctor, the diabetes educator and the diabetes psychologist (healthcare system), the relatives (patient ecosystem) or members of the *Diabetes Association* (social care) (Figure 4, macro level).
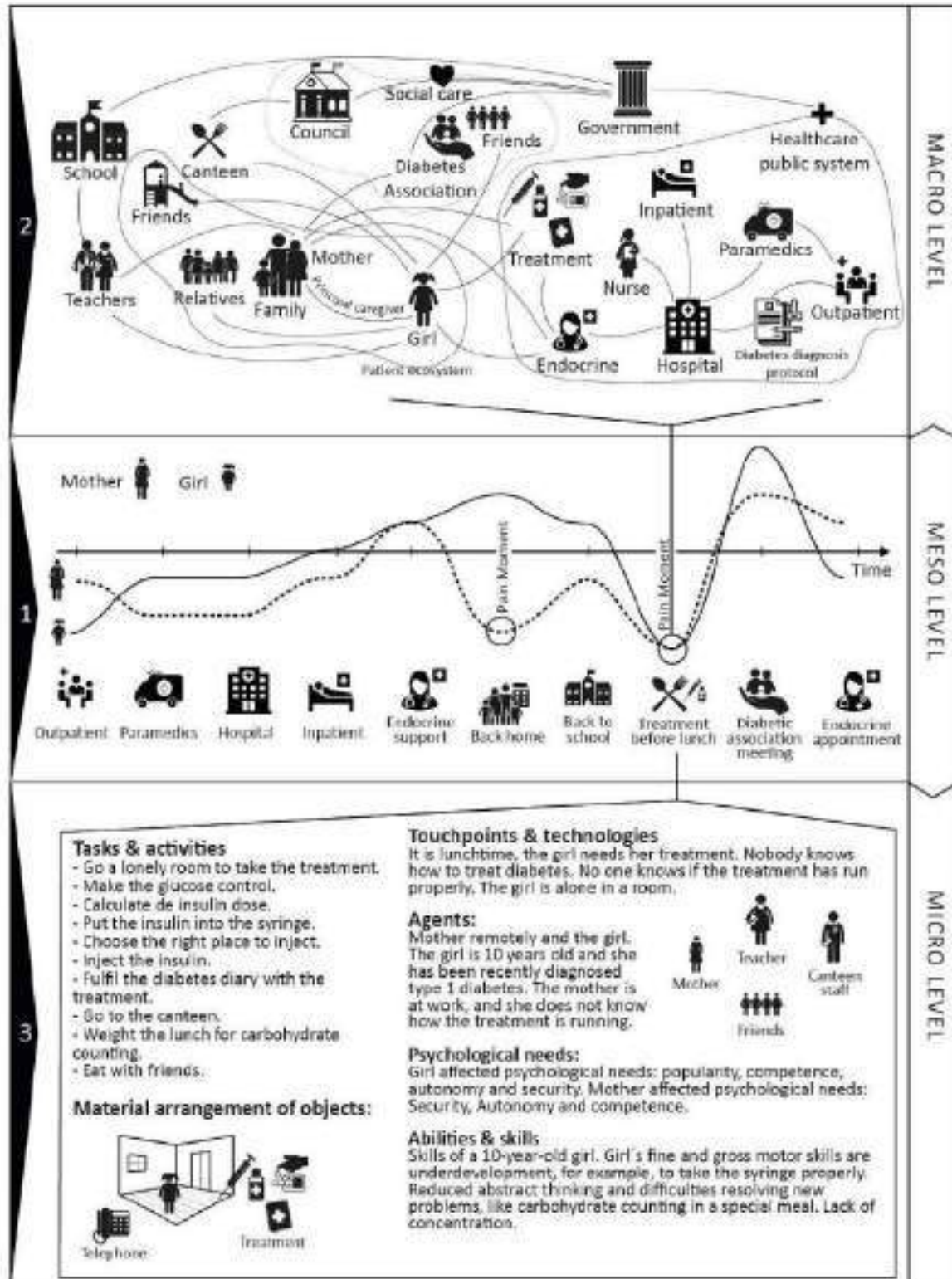
Figure 4: Empirical application of the framework for a recently diagnosed type 1 diabetes child.

Analysing the pain moment "having lunch at school" through the integrated framework, designers were able to understand that the regional education system is not always able to provide healthcare support. On the other hand, the healthcare system does not have the authority to provide healthcare inside the facilities of the school. A further complicating factor was that the canteen service was subcontracted by the council, making inter-agent collaboration even more difficult. Later in the generative session, this revealing insight guided the proposed ideas at the micro level, sharpening feasible proposals.

The integrated framework elicited insights regarding connections and linkages between different information levels in the patient experience, which can be essential for further idea generation in the healthcare sector.

Generative session

After the application of the framework designers proceeded with the identification of insights that led to idea generation. Prioritising pain moments by intensity and frequency, insight identification encompassed the three levels of information and designers were able to create connections among different insights leading to a variety of ideas. This produced a realistic patient analysis base to start creating new solutions that improved the journey.

Five different ideas evolved out of the generative session. These were related to developing skills and/or providing external support to the girl to successfully manage her treatment. Some of the ideas were related to treatment automation, adaption of the treatment devices or the use of information technology.

Evaluation and results

The designers reported that the framework helped to capture patient and caregiver´s meaningful information about their experience at a glance helping to become aware of their condition. The interviews made to fulfil the framework helped to empathise with the child and her mother.

They could easily identify the different pain moments, their intensity and frequency throughout their journey. They highlighted that the structure provided by the framework helped them to gather information during the interviews. Moreover, they emphasized that plotting the information in an integrated way helped them when linking and connecting insights for idea generation.

The panel of designers did agree on most of the positive features of the framework. Nevertheless, one interesting issue arose: It was pointed out that in healthcare-related product design, often solutions find difficult to enter the market, since their existence would mean changing the system.

The strategic designer focused on solving problems in a cross-sectional way, aligning the solutions to an experience-driven approach. This means, instead of focusing on a particular pain moment, she set the focus on the journey´s ups and downs, trying to develop a holistic solution.

The framework facilitated the performance of a detailed analysis of the context, circumstances and agents that intervene in the canteen situation, where the girl needed to manage her treatment. The study of this interaction significantly contributed to the capture of meaningful insights for new products and technological solutions.

The designers, however, found some limitations during the testing. Particularly, they suggested that a more robust framework structure would improve the information gathering process. They proposed supporting the framework with user research tools.

Conclusions

Creating new products and services to improve the patient experience represents a promising field that could greatly benefit from the expertise and contribution of designers and product developers. The complexity of the healthcare sector, however, can pose an important barrier for designers to articulate new feasible solutions (De Sousa Coelho & Branco, 2017), where specific tools and methods for the sector to overcome this barrier are limited. To this end, we presented a framework to support designers in this context.

The framework pre-structures information so that designers conduct qualitative research to gather systematic information aligned with the given theoretical underpinning. It captures meaningful design insights based on the patient experience. After analysis and synthesis, the obtained information is then transformed into insights. These insights are visualised to provide easily accessible representations of the experience (Segelstrom, 2013). Thus, the strength of the proposed framework relies on its integrated approach which

combines, organises and structures different levels of information that are relevant for revealing meaningful insights. When designing for the healthcare sector, designers need to put the patient at the centre of their activities, working towards the best quality of care. Consistent achievement of high-quality care can be guided, therefore, by the patient experience and design (Dixon-Woods et al., 2014; McColl-Kennedy et al., 2019).

The patient experience is at the core of our framework, and this serves as a basis for new products and solutions to be designed. It articulates new solution design pivoting on emotional intensity from the patient perspective throughout the continuum of care (Matheson, Pacione, Shultz, & Klügl, 2015). Another important contribution of the framework is that it integrates the caregiver perspective in the patient experience. Feelings such as anxiety and fear at different levels of intensity are experienced by both patients and caregivers throughout the journey (Carey, Rodgers, Tennant, & Dodd, 2016). Peaks in the intensity level highlight emotional frictions or pain moments, reflecting the disparity between the offered solutions and real patient needs (McColl-Kennedy et al., 2019). Analysing these peaks provides designers with insights to ideate new solutions that can contribute to close this gap.

At a macro level, our framework enables designers to understand the healthcare system and the identification of different agents that influence the patient experience at a certain moment. Different healthcare agents want the same thing: to improve people's health. Unluckily, lack of consensus among agents in a complex system is one of the biggest barriers to innovation (Jones, 2013). Including a macro level perspective is important because potential new solutions may involve changes in healthcare practices, which would have an impact on those agents. Acceptance by professionals, organizations and other agents is a key challenge for the success of new products, which needs to be taken into account when considering different insights.

Finally, designers need to understand the details of interactions within the patient experience so that they can seek innovation. Dealing with information such as the physical context, agents involved or tasks to be performed in an interaction are of significant importance for identifying meaningful insights. Additionally, the micro level of information in our framework refers to information beyond operational and clinical aspects. Factors such as underlying emotions, the psychological needs of different agents in the interaction, or specific patient abilities also need to be taken into account. We believe that these details are of significant value for designers to engage in innovation or new product design (McColl-Kennedy et al., 2019).

It was straightforward to apply the framework to our empirical case. We had the opportunity to evaluate our approach with a real-life chronic patient, and the feedback obtained from the participants was largely positive. The following factors were identified as the main contributions of the framework:

- To capture patient and caregiver´s meaningful information about their experience at a glance helps to be aware of their condition. The interviews helped to empathise.
- To identify and understand different agents and their roles supporting patients and caregivers throughout the journey.
- To understand processes and interdependencies among agents when supporting patients and caregivers.
- To understand how new products and solutions link to the psychological needs and skills of patients and caregivers.
- To gather a collection of especially relevant information which supported designers when capturing insights.
- To structure information collected from different domains in an integrated and organized way.

As our testing was limited to a single case, this study has certain limitations. It is complicated to state substantial findings that can be considered representative of the studied framework, which is still at a theoretical stage and comes out of logical argumentation. However, the first performed empirical test has begun to reveal some leads on aspects to improve the methodology: it must conform a space that allows researchers to collect information from a multidisciplinary viewpoint. This means two things. Firstly, each level of the framework should contemplate the possibility to add information from various agents that may operate at different levels. Secondly, the framework should provide researchers with ad hoc tools, and be a support itself which they could use in situ to gather information. Once those improvements are implemented on the framework, further empirical testing would be performed, that would result in the obtention of more reliable data to establish more significant results.

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Design as an Agent for Public Policy Innovation

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Described as units developing public policies in a design-oriented manner, Policy Labs are tasked to innovate to gain in policy effectiveness and efficiency. However, as public policymaking is a context-dependent activity, the way in which these novel organisations operate significantly differs. This study discusses the emergence of design approaches for policy innovation. The purpose is to map how Policy Labs in Europe introduce design approaches at distinct stages of the policymaking cycle. For this study, 30 organisations in Europe operating at various levels of government were surveyed. Based on the public policymaking process model, it investigates which design methods are Policy Labs deploying to innovate public policies. The study exposed a gap in the awareness of the utilised methods' nature. It also showed that the use of design methods is of less importance than the introduction of design mindsets for public policy innovation, namely 'user-centredness', 'co-creation', and 'exploration'.

Keywords: public, policy, innovation, design, labs

Introduction

In a global context of increasing complexity design has acquired a renewed momentum, for its potential to enhance economies' competitive advantage (Raulik-Murphy, 2010), but also as a strategic tool to foster innovation in the public domain (Junginger, 2014). Since 2008, policymakers worldwide are trying to develop innovative ways for sustainable growth (Bason, 2014). In this context, design has become central to some public organisations, employing designers and introducing notions of design thinking across the stages of the policymaking cycle (Junginger, 2017). Today, several Governments worldwide are gradually incorporating design approaches to develop public policies and services, recognising the value of service providers' and users' insights into the process (Bason, 2014). It is argued that design offers some potential to overcome the limitations of conventional policy methods to fostering public and social innovation by developing creative solutions (Mulgan, 2014).

Moreover, policy-making is conceived as a design activity (Johnson & Cook, 2014), and the implementation of such policies is subject to the design of services and products (Junginger, 2013). Particularly in Europe, central governments and local authorities alike are increasingly working with design managers and incorporating in their organisational structures multidisciplinary innovation units using design approaches (Whicher, 2015). Conceived in a global setting where the limits between public and private sector are becoming blurrier, these organisations look to integrate interests and ideas from various policy communities (Perl, 2013). Although considerably differing from each other, these organisations are frequently labelled as 'Policy Labs' and described as emerging organisations tasked with the devising of public policies in an innovative and 'designerly' manner (Fuller & Lochard, 2016). This study of design in public policy innovation targets these organisations that are comprised of multi-disciplinary teams who explicitly utilise design methods to involve a variety of users in the development of innovative public policies and services.

Similarly, focusing the study to a geographic region responds to this phenomenon (the emergence of Policy Labs) having originated in Europe (Bason, 2014), thus offering the possibility to inquire into the implications of using design for policymaking beyond government pilots. Although organisations incorporating these approaches have reached a supra-national level, systematic understanding of how design is being used to innovate public policymaking remains unclear. Even though there is a growing body of literature on design in policy-making, there is still scarce knowledge of the specific design activities that ultimately produce innovative policies. Understanding how design is currently being deployed in the making of public policies will aid in understanding the potential for developing innovative policy solutions. Furthermore, it will also allow us to understand its potential to modify deeply rooted policy practices and its subsequent impact in the larger socio-political system.

Design for public policy innovation

Interest in design in the public sector has grown over the last decade (Kimbell, 2015; Rosenqvist, 2017). References to design within public policy-making literature are today more frequent; however, it has been largely perceived as only relevant to the implementation stage, paying little attention to the introduction of design into broader aspects of the policy-making process (Junginger, 2013). The adoption of design in policymaking has been largely facilitated by service design's penetration into public organisations (Junginger, 2013). This creative approach to service innovation has been praised for its co-participative nature, stimulating public engagement (Sangiorgi, 2015). It is argued that design growth in the public sector relates to the way in which design-oriented companies (e.g., Airbnb, Apple) have enhanced customers experiences for new services (Kimbell, 2015). This, perhaps neo-liberal, approach to government-provided services has been explained by differences between citizens expectations and the services governments provide (Mintrom & Luetjens, 2016; Rebolledo, 2016). The design promise is to help creating user-centred services, consequently improving the users (the citizens) experience.

Furthermore, Junginger (2013) argues that despite not generally being understood in design terms, policy-making is essentially a design activity. Overarchingly, design and policy-making share the goal of changing existing conditions into preferred ones (Rebolledo, 2016). Yet, it is argued that whereas traditional policy-making pursues this from a normative stance, the design approach is based on a systemic and experimental fashion which offers prospective scenarios through creativity and prototyping (Rebolledo, 2016). Moreover, Junginger (2017) stresses that the benefits of introducing a design approach in policymaking, are deeper than the mere gains in efficiency, by also enabling the creating of more meaningful and faster-implemented policies. By employing design, it is then expected to develop new policies that are based on a human-centred approach to problem-solving (Junginger, 2013).

Of special interest in the development of public policies tackling complex societal issues is the notion that most of the problems addressed by designers are wicked problems (Buchanan, 1992). The result of designers dealing with these types of complex problems over the years has been the advancement of sophisticated professional practices within the designing disciplines able to do this (Dorst, 2011). Moreover, concerning the intractability of wicked problems, is the acknowledgement that more creative individuals engage in problem identification and generally present higher problem construction capability (Reiter-Palmon & Robinson, 2009). Dorst (2011) poses that frame creation is a core design practice by which a problematic situation can be tackled from an original standpoint. This is of high significance because it naturally puts designers and the use of design in a privileged position to target such policy issues.

Additional to that is the idea that "design thinking puts end-users needs –rather than legacy and policy– at the centre of the policy formulation system, shifting paradigms and creating a new decisional process" (Allio, 2014, p. 6). This feature is key since relocating the policy focus could counteract the effects of path-dependency limiting policy innovation. Furthermore, Tunstall (2007) points out the importance of design in making governance tangible to every citizen by giving them a voice in co-participatory policymaking processes.

Therefore, there is a rising consensus that design can play a significant role in restructuring governmental processes and structures (Rosenqvist, 2017). However, political science scholars, are unclear on the methods policy designers employ in identifying problems, defining design criteria or in the overall process (Mintrom & Luetjens, 2016). Consequently, the introduction of design practices in public policymaking has not yet acquired mainstream diffusion.

Public policy(making) innovation

Dissatisfaction on how governments deal with contemporary issues has arisen across the globe (Rosenqvist, 2017). Likewise, the growing number of co-dependent actors in societies makes finding, processing, and implementing solutions even more complex than it ever was (Janssen & Helbig, 2016). Furthermore, "the accelerating flow of ideas, information, goods and money across national borders has affected the nature of policy problems, [and] reshaped the attempts to engage these problems" (Perl, 2013, p. 44). This growing complexity in the issues governments face has also brought an increasing awareness of the inefficacy of the current policy instrument and processes to tackle them (Brookfield Institute, 2018). Moreover, it is currently widely accepted that governmental bodies' structures are not particularly appropriate to address current societal issues (Sangiorgi, 2015). For instance, the British Government already in 2011, recognised that "decades of top-down prescription and centralisation have put bureaucratic imperatives above the needs of [public] service users" (HM Government, 2011, p. 7). Additionally, budget reduction has meant the need for revising public services, often re-assessing user needs to obtain gains in effectiveness and better user experience (Whicher, 2015). Rebolledo (2016), refers to this situation in which there is a disparity between what people need and government do, whilst the latter also requires gaining effectiveness in designing and delivering policies, a two-folded innovation imperative. Junginger adds "we are at a moment in time where many governments are desperately looking for new approaches to policy making and policy implementation" (2017, p. 5).

Although the need for doing things differently regarding how public issues are tackled and how public services are provided has been largely recognised, the process of policymaking remains essentially unchanged. The process model is one of the most widespread means of depicting public policy-making (Howlett, Ramesh, & Perl, 2009), and it does so by disaggregating it into a set of discrete interrelated stages with a logical flow (Hallsworth, Parker, & Rutter, 2011). This process presents an identifiable pattern of activities, although rarely as orderly and systematic as the process model (see Figure 1) portrays it (Howard, 2005; Dye, 2013).

Figure 1: The public policymaking cycle, adapted from Howlett, Ramesh, & Perl (2009) and Dye (2013).

However, when it comes to policy innovation, political scientists have commonly focused on the innovation of the resulting product (the policy itself), ignoring the process by which innovative ideas make their way into government agendas (Mintrom, 1997). Policy innovation is then defined "as a policy that is new to the state adopting it" (Mintrom, 1997, p. 741). Borrowing from the economics of innovation, this definition could be understood as a case of product innovation, since it is based on the introduction of a new product or a qualitative change in an existing product (OECD, 2005). Others exclusively focus on the political aspect of policymaking, recognising policy innovations as those sought by politicians whilst looking for solutions which allow the attainment of conflicting policy objectives (Quiggin, 2006). Newer approaches define policy innovation as the "novel processes, tools, and practices used for policy design and development that result in better problem solving of complex issues" (Brookfield Institute, 2018, p. 6). Thus, emphasises the complex nature of the issues at hand and the need for new ways of policy-making to attain improved results. Similarly, an EY report on public sector innovation, claims "policy innovation is about identifying the needs of constituents and shortening the time required to develop, test, implement and diffuse a policy" (EY, 2017, p. 8). Here, the focus is set on providing the citizens with timely answers to their needs, in what could perhaps be considered a more client-provider relationship. Additionally, the process of policymaking and its distinct stages is made explicit. By stressing the need for reducing production and delivery times, the process efficiency is also highlighted. Again, stretching the definitions from the economics of innovation, we could consider these two definitions as examples of process innovation, in which innovations are oriented to the effectiveness and efficiency in which the organisation (in this case, the state) produces and delivers its products and services (Schilling, 2016). From this, a parallel between how innovation occurs in the private and public spheres can be drawn. As described by Utterback and Abernathy (1975), the outputs of an organisation embody the organisation's innovation at a product level, whereas those innovations in the manner it conducts its 'business' — including how the outputs are produced— represents process innovations (see Figure 2).
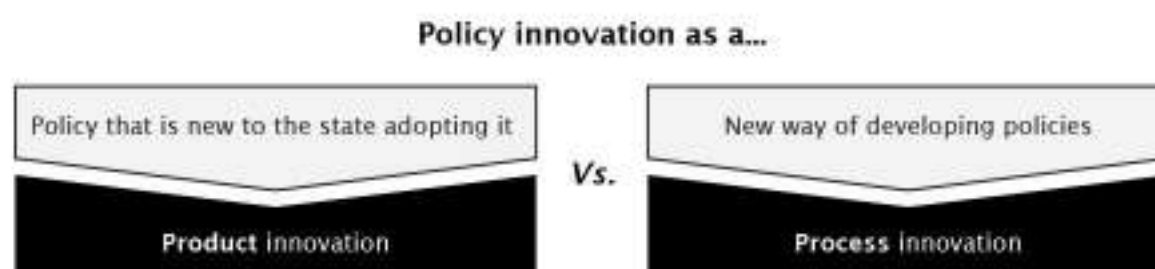
Figure 2: Policy innovation as product Vs. process innovation.

This policy innovation tension could then be described in terms of product-process dimensions. On the one hand, the innovations could be considered as the policies themselves, and the product and services they result in at the implementation stage. On the other, the focus could be set on the innovation of the process of developing new public policies. On this respect, Schilling (2016) stresses that product-process innovation's dynamics frequently take place in 'tandem', this means that innovative products may allow for the development of innovative processes, whereas innovative processes may also enable the development of innovative products.

Following the above, and in the face of new and more complex societal issues, it becomes clear why looking for novel and experimental ways of arriving at innovative solutions has turned into an imperative for many Governments. The rationale seems to be: if current policy instruments are not satisfying societal needs, innovating the process of policymaking may prove crucial to arriving at more adequate solutions.

Policy Labs as a vehicle for design for public policy innovation

In the last decade, public administrations worldwide have built organisations called Policy Labs in the pursuit of increasing the engagement of diverse and pertinent stakeholders, whilst facilitating experimentation in the public sector (van Veenstra & Kotterink, 2017). Albeit being different in form, structure, scope and origin, these organisations are broadly defined as:

…emerging structures that construct public policies in an innovative, design-oriented fashion, in particular by engaging citizens and companies working within the public sector (Fuller & Lochard, 2016, p. 2)

Setting-up new organisations to introduce these concepts into the public sector respond to several reasons. The scale and complexity of the challenges faced by the public sector trigger governments to look at new non-incremental ways of framing issues and developing solutions (OECD, 2017). Furthermore, it is recognised that a more systematic approach that institutionalises a culture of innovation as a core value in the public sector is currently required (Junginger, 2013). Also, that to creatively respond to complex problems, policymakers should develop the ability to envisage new scenarios (Considine, 2012). However, this clashes with the traditional notion of policymaking as a reactive activity, in which policies respond to past and present scenarios, rather than imagining future ones (Junginger, 2014). These novel approaches to creating public value are the means for public sector innovation and imply a shift in how the public sector operates (OECD, 2017).

Although most Policy Labs do not focus on a specific policy area, they share an interest in the participation of multiple stakeholders in the policy-making process (van Veenstra & Kotterink, 2017; Junginger, 2017). A 2016 report by the European Commission's Joint Research Centre recognises that Policy Labs play a vital role at every stage of the policy cycle, though their primary objective is on supporting innovation in the design of public policies (Fuller & Lochard, 2016). This, for instance, has led to the creation of the EU Policy Lab, "a collaborative and experimental space for innovative policy-making… [which utilises] design thinking to explore, connect and find solutions for better policies" (EU Policy Lab, 2016) at a supra-national level. Though not every EU member state features a Policy Lab, governments from those without one have expressed the aim of creating their own, based upon others' experiences in the EU (Fuller & Lochard, 2016). These "special organizational units created at the local, regional or national level have begun to explore how new design methods and new approaches can help them address concrete problems" (Junginger, 2017, p. 6). The need to create special organisations for adopting such methods, could be explained by public sector organisations being described as bureaucratic, hierarchical and risk-adverse structures (Sangiorgi, 2015), which find some design methods to be inappropriate due to their 'playfulness', or tendency for "short-circuiting the traditional decision-making structure by circumventing the political arena" (Bailey & Lloyd, 2016, p. 10). This is interesting since policy scholars claim that "the variety of instruments available to policy-makers is limited only by their imaginations" (Howlett, Ramesh, & Perl, 2009, p. 114). Although only a handful of studies on specific Policy Labs provide with accounts of bespoke design approaches for specific contexts (Bailey & Lloyd, 2016), there is currently no overview on how this "design-oriented fashion" to public policy innovation is being interpreted.

Considering Policy Labs for the study of design in public policy innovation responds to their explicit use of design for such endeavours. Similarly, limiting the study's data collection to European organisations responds to the phenomenon's geographical nature. In this regard, Bason (2014) states that experimenting with design methods in the public sphere has firstly appeared as an Anglo-Saxon and Nordic practice. Consequently, the most longstanding Policy Labs find their roots in Europe, allowing the study of design for policymaking beyond the initial experimental stages, as is the case of more novel initiatives taking inspiration from the European experience.

Research Design

This study mapped the design methods/tools that Policy Labs in Europe utilise when intervening in public policymaking. Adopting a process perspective, these design methods/tools were identified at different stages of the policymaking cycle. Data was collected through online surveys conducted between January and November 2018. The sampling was based on that presented in the European Commission Joint Research Centre–commissioned report Public Policy Labs in European Union Member States (Fuller & Lochard, 2016), and expanded from the original 13 countries as to cover all 46 UN recognised states in Europe. In addition to the four-level classification (City, Metro, Regional, National) used in the above-mentioned report to identify the organisations' reach, the supra-national level category was also considered.

Data collection

A survey was sent to 81 organisations in all 46 UN recognised European states. This inquired about the organisation's understanding of policy innovation in terms of the dichotomy 'product vs process innovation', at

which stage of the policymaking process they intervene (according to the six-stage model presented), and the methods/tools utilised at each stage to innovate public policies. Participants were not given definitions of 'method' and 'tool', nor that of a 'design method/tool'. The sample consists of:

- 46 UN recognised states in Europe;
- 28 EU member states;
- 81 organisations identified as of interest;
- 17 states with at least 1 organisation of interest.

The online survey was divided into two parts. The first part was sent to the 69 organisations in the sample, and the second part was only sent to those organisations which completed the first part. This resulted in:

First survey:

- Opened in January 2018;
- First survey: 69 contacted (85%) out of 81 organisations;
- 30 valid responses (43% of all 69 organisations contacted);
- Responses from 16 countries (89% representation of all 17 countries with at least 1 organisation of interest).

Follow-up survey:

- Opened in February 2018;
- Sent to 30 organisations;
- 17 responses (57% response rate).

The first survey consisting of eight questions was sent to 69 of the 81 organisations initially identified as of potential interest. The filtering responded to a few reasons, namely, some of the organisations listed in the report Public Policy Labs in European Union Member States (Fuller & Lochard, 2016), were no longer operational by the moment the survey was sent, or further desk research showed that these initiatives were small scale projects rather than established governmental units. The follow-up survey was opened a month after and consisted of nine questions with a focus on the respondents understanding of public policy innovation and the methods/tools they utilise to achieve it.

Results

From "a number of Policy Labs […] in a handful of Member States of the European Union" (Fuller & Lochard, 2016, p. 2) reported in 2016, the situation seems to have evolved to a much larger number of organisations in 17 countries across Europe (see Table 1).

Table 1: Surveys respondents' distribution

Country	# first survey respondents	# second survey respondents
Armenia	1	0
Austria	1	1
Belgium	1	0
Denmark	3	2
France	3	2
Georgia	1	1
Ireland	2	0
Italy	1	1
Macedonia	1	1
Moldova	1	0
The Netherlands	2	1

Poland	2	1
Portugal	1	0
Spain	2	1
Sweden	2	2
Switzerland	1	0
United Kingdom	5	3

First Survey

Regarding the reach of these organisations, the largest proportion (56.7%) of the respondents indicated they operate at a national-level (see Figure 3). On the other end of the spectrum, 16.7% claim to be doing so at a supra-national level. However, when looking at the individual responses, only two of these organisations have decision-power at a supra-national level, whereas the other three are foundations and academic-based organisations whose work is commissioned by foreign governments and organisations.
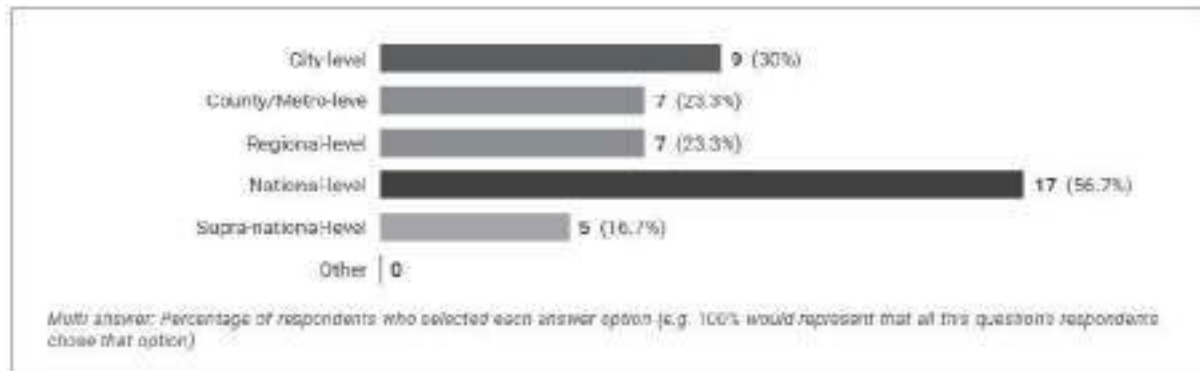
Figure 3: Distribution of the sample's reach. Based on 30 responses.

The initial survey tried to elucidate to what extent using the term 'Policy Lab' as a proxy for 'organisation developing public policies in a design-oriented and innovative fashion' serves as an all-embracing label. The results showed that although 56.6% of the surveyed organisation are either formally or informally known as a 'Policy Lab' (see Figure 4), over 40% of them are not. This negative response includes organisations which had been labelled as such in previous reports (e.g., Sweden's Experio Lab considered a 'County/Metro-level Policy Lab' by Fuller & Lochard (2016)). Moreover, less than a fourth of all respondents are formally known as 'Policy Labs', suggesting that the current label does not effectively encompass all organisations working under the definition.

Figure 4: Sample's identification as Policy Labs. Based on 30 responses.

The main objective of the survey's first part was to map the organisation's activities in terms of the policymaking cycle (see Figure 1). Respondents were asked to indicate at which stage their organisations intervene, allowing for multiple responses. As can be seen in Figure 5, there are consistent responses regarding the agenda-setting, policy formulation, policy implementation, and policy evaluation stages, with over half of the respondents indicating their participation at those stages. Perhaps the most noteworthy stages in the cycle are the problem identification and decision-making stages, with 86.7% and 30% responses,

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respectively. Whereas organisations from all the spectrum seem to be engaging in the former, the latter is almost exclusively reserved for organisations embedded in the public sector, with the only exemption being a Policy Lab with origins in a public university. Also, three organisations described their participation in policymaking outside the stages of the cycle, either indicating they "…also participate in policy piloting at smaller scale", or they participate in "policy making process design & innovation" or simply stating that they do policy "experimentation". Moreover, another remark of interest relates to the inability of one organisation in accomplishing its mission due to what seems as meagre political will, stating they "should be part of the agenda-setting stage, but this would require a higher buy-in from our partners in Government".
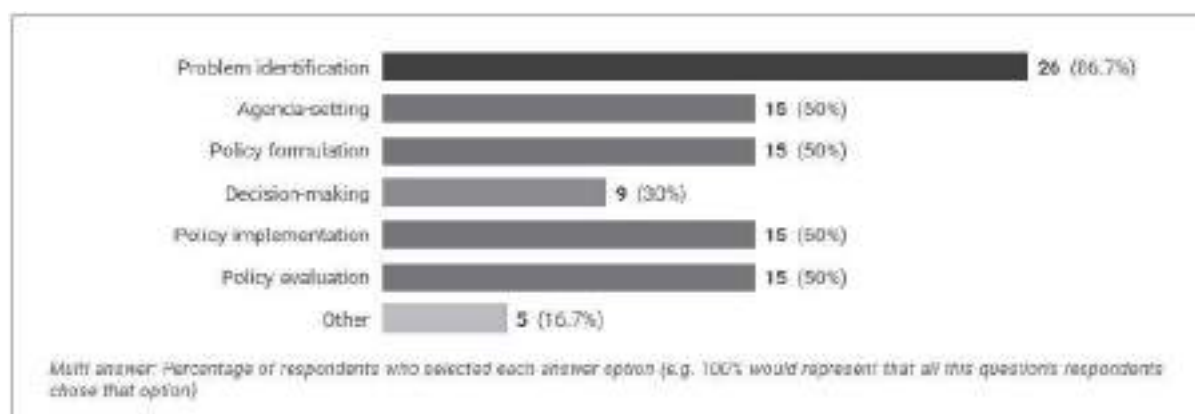
Figure 5: Organisation's intervention at each stage of the policy-making cycle. Based on 30 responses.

Follow-up Survey

The second part of the survey focused on the organisation's understanding of public policy innovation regarding the 'process vs product innovation' dichotomy presented, as well as the methods and tools utilised by them in the pursuit of policy innovation. Unlike the first part of the survey, this second part was only sent to the 30 organisations which completed the first part. Therefore, the results are based on 16 responses.

In regard to their view on public policy innovation, participants were asked to indicate whether the organisation understands it as "a policy that is new to the government adopting it", "a new way of developing public policies", both approaches, or none of them, this last one under the option "other" (see Figure 6). Interestingly, although no organisation understands public policy innovation exclusively in the traditional terms, half of the respondents reported that public policy innovation refers to both approaches, with the remaining seven participants responding it is solely about a new way of developing public policies.
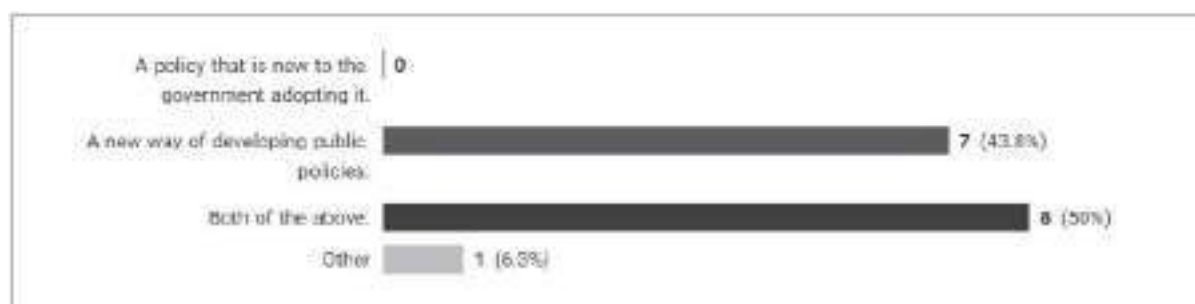
Figure 6: Organisation's understanding of public policy innovation as product vs process innovation. Based on 16 responses.

In a follow-up question (see Figure 7), participants were asked if their organisations aim at innovating how public policies are made, with 62.5% responding affirmatively.

Figure 7: Organisation's aim to produce public policy innovation from a process perspective. Based on 16 responses.

The following question inquired as to why innovation is relevant to public policy-making? Although there was no restriction on who could respond, this open-ended question was responded to by those who had previously asserted that their organisations were looking at innovating how public policies are made. Specifically, some participants argued that innovation is relevant to public policy-making "to create more effect", as well as "to ensure effectiveness of the policies", while others explicitly recognised the complexity and nature of current issues as the most important reason for innovation in public policy-making:

> *"To address complexities of our time and to solve wicked problems new approaches to policy making are needed (stakeholder involvement, evidence-based decision making, ...)"*

or

> *"Because it helps policy makers find more relevant solutions for the challenges of the modern time like climate and economic challenges, improve the governance and respond effectively to the changing context of complexity and uncertainty."*

Another participant pointed out that the current policymaking process does not necessarily consider the user's needs in its development, hence the need for innovation:

> *"Public policies are supposed to work for people, each with specific needs. One can never expect one policy to work for each individual, but one may expect the policy-making processes to start with the needs of people. To incorporate the lived realities of people in policy-making means to continuously involve people in the process – something that rarely happens on a structural basis."*

With the aim of mapping the methods/tools utilised when intervening in the policymaking process, the survey asked participants firstly, if their organisations utilise different methods/ tools at different stages of the policymaking process to innovate public policies, and secondly, if their organisation utilise design methods/tools (i.e., persona creation, user journey mapping) to innovate public policies. The results showed that 14 of the 16 organisations utilise different methods/tools at different stages of the policymaking cycle, and 12 of those organisations utilise design methods. The remaining two organisations which do not use different methods/tools at different stages of the policymaking cycle do claim to use design methods/ tools in their activities.

Regardless of the high rate of positive responses about the use of design methods/tools to innovate public policies, the respondents were not always clear on what those methods are. Similarly, the notion of method/tool was not clear for all participants. For instance, one participant who explicitly responded that "co-design workshops" are used at the policy formulation stage clarified that "probably none of [the] mentioned… are really a tool or a method (in strict sense)". This view was echoed by another respondent who explained that:

> *"The task… [of the] Lab as part of public healthcare is to grow design capabilities and capacity to better integrate the resources of patient/relatives in delivery, development, service innovation and policy making. We are there to create a meeting between Healthcare and Design where both worlds can learn from each other. Design or service design for us is a mindset and the approach we use in all projects and work. Therefore we use and adapt a variety of design methods/tools and adjust to the project at hand. In early stages of course more anthropological tools to investigate user needs/behaviors, etc. Later on journeys/personas, etc to describe insights. Prototyping to explore and implement solutions."*

Table 2 below shows the participants responses when asked to identify the methods/tools their organisations used to innovate public policies at each stage of the policymaking cycle.

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Table 2: Mapping of design and non-design methods/tools utilised at each stage of the policymaking cycle. Based on 16 responses.

	Problem Identification	Agenda-setting	Policy Formulation	Decision Making	Policy Implementation	Policy Evaluation
Design Methods	Ethnographic fieldwork	System Dynamics Modelling	User Centred Design	Agile method	Service design, monitoring systems	Data harvesting (monitoring phases)
	Digital ethnography	Prototyping/testing	Co-design enabling	Prototypes	Spend time with the team who has to use new tools or spaces.	Ad hoc valuation approaches
	Scenarios	Strategic conversation	Co-design workshop (preliminary phase)			
	Data analysis-interpretation	Ws (concept design)				
	User journey mapping	Scenario-based techniques				
	Design Thinking	Agile method				
	Sociology	Foresight	Design thinking			
	Psychology					
	Qualitative interviews					

In Table 2, some of the responses –such as 'Ethnography' or 'Prototyping'— were used as examples for more than one activity, design and non-design methods/tools. Some other responses seem to be representative of specific practices (e.g. "Spend time with the team who has to use new tools or spaces") rather than standardised methods. In this regard, it is important to mention that definitions of 'method' and 'tool' were not provided.

Although most respondents recognised the use of different methods across the policymaking cycle, some were unsure when asked to identify at which each stage they were used. However, respondents were still able to provide examples of these design methods/tools, namely:

- Ethnographic research;
- Co-creation;
- (Rapid) Prototyping;
- Experimentation;
- Co-Creation;
- Personas;
- User Journeys
- Design Thinking;
- Gamification;
- Human-centred design.

One respondent who claimed their organisation does not use different methods/tools at each stage did mention the use of "design thinking [and] design-driven innovation" throughout the cycle. On the other hand,

one respondent said they "use so many [methods and tools] and at different points. It very much depends on the question we are trying to address".

Discussion

In this section, we analyse and discuss the results of both surveys, considering the design literature presented. Firstly, although the term 'Policy Lab' has served as an umbrella designation to encompass all organisations working in the development of public policies innovatively, only a limited proportion (<25%) of the surveyed organisations are formally known as such. This makes explicit the need for coining a broader term to designate organisations working in this area.

The nature of design-specific methods and tools

The study highlighted a lack of coherence on which methods and tools are specifically useful and where the role of the design becomes most useful and fulfilling for policy innovation. One evident aspect of the responses to the survey is the interpretation of what constitutes a design method/tool. The survey did not control for the 'design literacy' of the respondents, however, and without delving into what makes a design method, it is difficult to conceive a trained designer claiming 'sociology' or 'psychology' being one. Likewise, 'design thinking' or 'user-centred design' are seldom referred to as design methods/tools in the literature. Nevertheless, participants expressed that design is being used in their organisations. This discrepancy could be attributed to the fact that it is not the use of design methods/tools what constitutes these organisations design-led approaches. This could be rather based on the mindsets a design approach entail. Likewise, this could explain the broad definition used thus far, in which public policymaking is addressed by these organisations in a 'design-oriented fashion', without necessarily resorting to specific design methods. The notions of 'user-centredness', 'co-creation', and 'exploration' –typically through prototyping— appear as key aspects of this innovative approach associated with a 'designerly' manner. Moreover, the recurrent identification of 'agile methods' as a design method may support the idea that specific methods are not the most relevant aspect of these organisation's practices. As the Agile Manifesto (Beck et al., 2001) expresses, the focus should be more on individuals and interactions instead of processes and tools. Further investigating the specific characteristics that shape these design-led approaches will be key to understanding how design can contribute to public policy innovation. Similarly, assessing how expert design knowledge is introduced in these organisations will also help in fully understanding how design is being utilised.

Bringing design approaches to initial stages of the policymaking cycle

The stages of the cycle at which these organisations intervene also highlights an interesting point. A majority (>85%) of the surveyed organisations claim to be intervening at the problem identification stage of the policymaking cycle, and this resonates with the use of a design approach. This is because the ability to create frames which might help in tackling wicked problems is a key skill in addressing complex societal issues. Moreover, this skill has been associated with core professional design practices which allow for the development of original solutions. Furthermore, the need for innovating and bringing new approaches to public policymaking has been explicitly connected to the need to address the complexities of current social policy issues. This links together the notions of contemporary complex societal issues, the need for policy innovation, and the introduction of design to fostering such innovation. Additionally, one implication of these organisations operating at earlier stages of the policymaking cycle (as opposed to solely at the policy implementation stage) is a shift from the origins of the uses of design in public policymaking, where design was employed to operationalise solutions which had not necessarily arisen from a design-led process. However, it is not clear, if these organisations transit a process of problem reformulation once they have been tasked with a defined policy issue, or if the problem identification is conducted from the outset to push the identified problem into the policy agenda later. Should the former be the case, the design process could be entirely occurring at the policy implementation stage. What did become clear is that the decision-making stage of the policymaking process is still reserved to a limited set of policy actors, most of whom do not seem to belong to these organisations.

The need for substantial change to the public policymaking process

With none of the respondents subscribing to the traditional view of policy innovation as exclusively the introduction of a new policy by a government, the idea that the process by which policies are developed is of

utmost importance became evident. However, with half of the respondents indicating that public policy innovation should involve both, a new process and a novel outcome, the parallels between public policy innovation and that described in the economics of innovation is clear. This seems to indicate that innovative public policies can hardly emerge from the way they have been traditionally developed, signalling its exhaustion for providing appropriate solutions. Two main arguments appear crucial in supporting this. Firstly, the need for innovation to address the complexity of current social policy issues, suggesting the traditional processes fail in doing so. The staged-model represented in the policy cycle could be key to understanding how policymaking has been mainly conceived in a reductionist manner, limiting the Government's capacity to integrate a systemic approach to their development. Secondly, including the inputs from a larger set of stakeholders throughout the policymaking process is imperative in developing meaningful and appropriate public policies. The literature is explicit in recognising that during most stages of the cycle, only subsets of the policy universe are involved (Howlett, Ramesh, & Perl, 2009). However, there seems to be an exceptional urge for including the inputs from a very specific group of stakeholders: the users. With the advent of service design at the policy implementation stage, the introduction of the user's perspective in public service development has gained traction, due to its extensive use of co-productive approaches. However, in a more holistic view of the policymaking process, devising a public service may not be possible to disaggregate from the framing of the problem being addressed. Amongst other reasons, this becomes clear when considering the prototyping of solutions, an aspect highlighted by the surveyed organisations. Prototyping will necessarily mean a non-linear process where several iterations of the solution, including the further reframing of the problem, are likely to occur. This consideration, resorts back to the first point, urging for a more systemic approach to the policymaking process.

Conclusion

Incorporating design approaches in the making of public policy seems to hold the potential for fostering innovation, according to this study's participants. However, the introduction of design in the public policymaking process does not appear to be attached to the use of specific design methods, but rather to certain 'designerly' mindsets, namely, 'user-centredness', 'co-creation', and 'exploration'. User-centredness relates to the shifting of the policymaking process' focus towards the 'main' users affected by the policy to be conceived. This implies maintaining a constant feedback loop with these users throughout the process. Concordantly, 'co-creation' refers to the joint development of policies and their actionable outcomes by several stakeholders which might not typically be involved in such activities. This includes, but it is not limited to, those directly affected by the new policy (the 'users') and frontline public servants. The exploratory mindset is embodied by a willingness to experiment with solutions that do not necessarily resemble the existing policies, thus breaking from path-dependency. It also suggests a positive attitude towards failure, in which several iterations of a proposal are tested against assumptions and with several stakeholders, consequently reinforcing the user-centred and co-creative spirit.

New ways of developing public policies as well as new public policies better suited to deal with current societal problems appear to be a requirement for most governments. However, the latter seems to be largely dependent on the former, often demanding significant changes in the public policymaking process. Whereas previously an analogy with the product versus process model for technological innovation was presented, it became apparent that certain features, such as the 'tandem' dynamic where innovative processes may allow for the development of innovative products and vice versa, is not met. Furthermore, as key stages of the process, such as the decision-making stage, remain in control of limited policy subsets a comprehensive co-creative approach to public policymaking will only be partially implemented. Furthermore, retaining the decision-making power in a reduced portion of the stakeholders will continue to hinder exploratory approaches by, for example, interfering in the feedback loops and policy development's timescale. It appears the public policymaking process will require extensive revision to fully incorporate a design approach with the potential of affecting substantial change, as well as to enable a systematic production of innovative solutions.

Lastly, Policy Labs, or more generically, organisations working in innovative public policymaking are promoters of the introduction of design mindsets in this realm. Arguably, the design capacities in these organisations may not be distinctly robust, since, for instance, their understanding of specific design tools and methods is notoriously fuzzy. This does not necessarily imply a detrimental effect on the outcomes they can produce, as the design mindsets employed by these organisations can be learnt and appropriated beyond the use of design methods and tools. However, some of these principles, such as problem re-framing considered crucial in the ability to develop innovative solutions, are sophisticated professional practices which might require in-depth

understanding and long-standing experience to be effectively deployed. Low performance due to limited design expertise may undermine these organisation's legitimacy, thus having a detrimental effect on the expansion of innovative public policymaking processes. Regardless, the shifting of these organisations towards the early stages of the policymaking process may, if the current power structure permits it, precipitate further changes in the way public policies are conceived. Perhaps even making design literacy a key skill of future policymakers.

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Track 2.a Introduction: Decolonising Knowledge to Transform Societies

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The aim of this track was to question the divide between the nature of knowledge understood as experiential in indigenous contexts and science as an objective transferable knowledge. However, these can co-exist and inform design practices within transforming social contexts. The track aimed to challenge the hegemony of dominant knowledge systems, and demonstrate co-existence. The track also hoped to make a case for other systems of knowledges and ways of knowing through examples from native communities.

The track was particularly interested in, first, how innovators use indigenous and cultural systems and frameworks to manage or promote innovation and second, the role of local knowledge and culture in transforming innovation as well as the form of local practices inspired innovation. The contributions also aspired to challenge through examples, case studies, theoretical frameworks and methodologies the hegemony of dominant knowledge systems, the divides of 'academic' vs 'non-academic' and 'traditional' vs 'non-traditional'.

The 4 paper from 9 authors approach the theme of this track from various perspectives, highlighting different aspects of approaches to other ways of knowing, leading to change and transformation in design. The responding papers came from rich and diverse cultures of India, Namibia, South Korea, United states, United kingdom, Australia, Sweden and showcased examples from many more contexts. The accepted papers covered various forms of decolonisation.

In the first paper, In Colonizing Innovation: The Case of Jugaad, Abhinav Chaturvedi and Alf Rehn question the currently popular concept of frugal innovation that has been appropriated in western management literature as an innovation. This popular phenomena has its roots in the culturally colonial appropriation of indigenous knowledge systems. They sequentially explore various journals for use of postcolonial theory or thinking to inquire into the knowledge systems of innovation studies and innovative thinking, and also break down the concept and phenomenon of Jugaad to understand its linkages. Thereafter, they examine the colonisation of Jugaad through exortisim and narratives of want, and the commodification of the terms as well as the knowledge system; calling for an understanding of the phenomena of non-western paradigms to be reviewed and understood for their own worth and through their own lens.

Boeun Bethany Hong and Sharon Prendeville, in their paper Understanding Development Discourse through Ontological Design: The case of South Korea examine the case study of South Korea's manufacturing industry and its replication as a form of coloniality. While the authors begin their paper with understanding discourse and its relationship to ontological design. Through empirical analysis they demonstrated how the current manufacturing industry in South Korea has been evolved through development assistance strategies from the west. However, in replicating their hegemony of manufacturing know-how in the South-Asian region they are replicating the "West-centred" discourse of developmentalism.

Melanie Sarantou, Caoimhe Isha Beaulé and Satu Miettinen explore Nambian art and design proliferation through the frameworks of decolonising design and participatory service design with scope of improvisation therein, that allows the participants agency to shape the service. They analyse the role of Art South-South Trust (ASST), a start-up Namibian not for profit (NFP) organisation, as service providers, in increasing visibility and enabling global exposure of the artists, designers and artisans. The paper draws on reflective practice to analyse the data of interviews of various Namibian and Australian partner art organisations. It also uses reflective practice to analyse the focus group discussions between Namibian artists, designers, artisans and arts organisations. The authors use critical thinking to evaluate the findings of the focus groups need for awareness and open dialogue and the plural identities and the complex social, economic and cultural environments in which the participants live and function. Expectations of focus groups were to promote Namibian artists and designers globally through sustainable links with art and design organisations, providing feedback to participants and the broadening of knowledge and experiences. The authors suggested sustained engagement with international markets, efficient, yet flexible and agile management protocols. The authors finally build a practical framework for decolonising practices in Namibian art and design through a mindful and enacted shift from stifling institutions to a willingness to erode and fight power structures associated with institutionalisation. The challenged institutional politics and gatekeeping in the arts by suggesting an alternative participatory framework. They elaborate that this could be achieved through adopting bottom-up approaches as well as fostering capacity building in areas of service design, digital business management and marketing and digital storytelling.

The final paper in the track was by Nicholas Baroncelli Torretta and Lizette Reitsma, through enquiring three Design for Sustainability (DfS) projects through design approach strategies, made a case for challenging colonial and modern development structures. The authors problematises the dynamic between situated place, situated community and design work. They also problematise the term sustainability is deeply local and tied to specific nature/culture contexts and as a collective global action for life on planet. They use Paulo Freire's decolonial perspective to analyse the approaches of the case study. They first take on the approach of design activism in an example of Design for Sustainability (DfS), projects on urban farming in Finland. The second approach is of humbling designing shown through a DfS project of energy conservation project in Sweden. Lastly, Radical Listening as design approach in the case of preserving tropical forests through offering healthcare in the context of Borneo. The authors also caution against the use of Design for Sustainability (DfS), projects themselves becoming as a colonial tool. They conclude that steering DfS to become decolonial or colonizing is a relational issue based on the interplay between the designers' position in the modern/colonial structure, the design approach chosen, the place and the people involved in DfS.

All the papers examine the role of local knowledge and culture in transforming innovations. Situatedness, local-global community interplay, indigeneity and identity become a feature in every case study that has been discoursed. All papers locate the innovations inspired by local practices, and diverse design approaches as means of decolonising and challenging the hegemony of western paradigms. They showcase experimentations and scales in this knowledge domain, through their own categories. The diversities of the case-studies and the many locations of the examples show the many ways in which designers, communities, organisations and innovators challenge the expertise position, while acknowledging the models of experiential, subjective and tacit knowledge that making/doing/problem-solving inherently hold. The track also paves way to view these knowledge beyond binaries, create new dialogues and evolve a common language through diverse action examples. The papers examine diverse design approaches and contexts, however the commonality is the caution about any of these case studies or approaches becoming an colonial tool.

Colonizing Innovation: The Case of Jugaad

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Innovation is one of the most popular concepts and desired phenomena of contemporary Western capitalism. As such, there is a perennial drive to capture said phenomena, and particularly to find new ways to incite and drive the same. In this text, we analyze one specific tactic through which this is done, namely by the culturally colonial appropriation of indigenous knowledge systems. By looking to how jugaad, a system of frugal innovation in India, has been made into fodder for Western management literature, we argue for the need of a more developed innovation critique, e.g., by looking to postcolonial theory.

Keywords: innovation, innovation critique, postcolonialism, indigenous knowledge systems

Introduction

As a concept and the desired end-state, innovation and the innovative organization has for many years been a mainstay in the global debate on management and the drive towards increased efficiency and profit. The modern corporation needs to at least present itself as innovative, or it risks being punished on the stock market (see, e.g., Sood & Tellis, 2009) and in the public debate, and the same goes for business thinking more generally. To be seen as relevant, both CEOs and business pundits need to show continuous innovative activities, pushing both towards a homogenized business discourse (see, e.g., Collins, 2000) and a relentless desire to increase levels of innovation – or at least to make it appear that this has been achieved. At the same time, an increasingly globalized market economy presents companies with additional challenges. Where companies earlier could trust markets to be relatively homogenous, products and services must today often be geared to more and more precisely defined such. Markets that were earlier seen as secondary, such as India and China, are today viewed as central. No wonder, then, that corporations see a great deal of value to be had from gearing innovation efforts towards these spheres (Bruche, 2009; cf. McKenna, 2011). However, in the field of innovation, this cultural 'awakening' also has a flipside, one where non-Western markets are seen not only as a space in which to increase market- share but one from which innovation inputs can be harvested.

This latter move, where previously marginalized markets are seen as a key source for innovation insights, takes some forms. On the most basic level, global companies routinely strive to localize their products and services for new markets and use cultural insights to do this (Petison & Johri, 2008; Swoboda, Pennemann, & Taube, 2012). On another level, markets can be studied for their specific needs, and the existing knowledge and competencies of the corporation can be deployed to serve these (see Anderson & Markides, 2007). Such aspects are well known in the literature on both innovation and, e.g., international business, and we will not here delve deeper into them. Our interest is on the level where the interest of companies isn't to understand the specifics of the market, but rather to utilize 'indigenous knowledge systems,' i.e., culturally specific forms of knowledge and knowing, to enhance their innovation capacities.

The concept of indigenous knowledge (and the systems thereof) comes to us from anthropology (see e.g. Battiste & Henderson, 2000; Semali & Kincheloe, 2002; see also Banerjee & Linstead, 2004), and emphasizes that cultures develop ways of analyzing their world, forming knowledge about the same, and creating novel meanings that stem from their local context rather than from a general mode of 'thinking'. Whereas Western analyses of knowledge emphasize specific modalities of sensemaking (including a strong reliance on 'objectivity' and abstracted empiricism), these shouldn't be seen as general and eternal, but rather as forms of indigenous knowledge unto themselves. Other ways of knowing and thinking, such as it may form in, e.g., a rural Indian, Indonesian or Chinese context, is in such an understanding not erroneous simply because it holds different modalities of knowledge, and can in some contexts even be better suited for the specific locality than the assumedly more objective Western knowledge. This is not, particularly in our use of the term, to be mistaken for absolute cultural relativism or knowledge nihilism. Rather, it emphasizes that local knowledge systems can a) have special insights into specific matters (such as how to utilize resources that are special for an area), and b) provide valuable alternative interpretations and perspectives.

It is particularly this last point that is of interest here. Within the field of innovation, one might say that the art of developing alternative perspectives forms the very core of innovative thinking[1] . In a sense, all innovation hinges on seeing an existing product, service, process or model in a new way, making alternative perspectives valuable in and of themselves. It should come as no surprise, then, that indigenous knowledge is potentially valuable within innovation thinking, particularly if this can be harnessed – either directly or symbolically – to further new avenues in this field. This paper deals with a specific case of this, namely the manner in which jugaad, a form of indigenous knowledge stemming from India, is turned into a resource for Western innovation thinking.

Jugaad, which we will detail as a concept later on in the paper, is in effect a particularly Indian philosophy of innovative problem-solving in situations with very limited means. Its practitioners, jugaadu, are often part of the most socioeconomically challenged group in India and characterized by being poor to the level of destitution, illiterate or functionally illiterate, uneducated and often either living in rural areas or having a rural background. They are, to put it succinctly, among the poorest of the global poor. At the same time, as detailed in a number of contemporary management books (see e.g. Birtchnell, 2013; Leadbeater, 2014; Radjou, Prabhu, & Ahuja, 2012; Radjou & Prabhu, 2015), they have shown a tremendous capacity for developing novel solutions using extremely limited resources, utilizing an improvisational approach to technical development reminiscent of bricolage (see Baker, Miner, & Eesley, 2003; Garud & Karnoe, 2003) and what in entrepreneurship studies has been called effectuation (see Sarasvathy, 2009).

Here, our interest is in the manner in which jugaad has been appropriated in Western management thinking, both as an example of the exotic Other (Jack, Westwood, Srinivas, & Sardar, 2011; cf. McKenna, 2011) and as a potential knowledge-base to be colonized. In the latter case, jugaad is recast to align with the Western preoccupation of continuous progress, and further with the triumphalist notion that innovation can, as long as the mindset is correct, be done with little or no resources. We will return to this latter point.

In the following, we will discuss the possibility of discussing innovation through the lens of postcolonialism, after which we will introduce jugaad in more depth. Following this, we will analyze the manner in which jugaad has been utilized as a resource in Western management thinking, and end by discussing the problems inherent in colonizing indigenous knowledge systems within innovation thinking, and in management studies more generally.

Innovation and Postcolonialism

As a theoretical field, postcolonial theory (see, e.g. Said, 1979; Bhabha, 1994; Spivak,1987), has been widely deployed in the field of organization studies (see Prasad, 2003, 2012; Banerjee & Prasad, 2008, Frenkel & Shenhav, 2006; Jack, Westwood, Srinivas, & Sardar, 2011; Khan, Munir, & Willmott, 2007; Nkomo, 2011). Inspiration from key postcolonial thinkers such as Edward Said, Gayatri Spivak, and Homi Bhabha has enabled scholars of the organization to question Eurocentrism, the primacy of Western knowledge and narratives of organizational identity in ways that have enriched our understanding of organizational life in a

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[1] We will in this text use 'innovation studies' when referring to the academic field and the academic literature, and 'innovation thinking' when referring to the more popular field, i.e. the field of business books and similar material for non-scholars.

globalized society. However, the deployment of postcolonial theorizations has been very uneven. It has had its main champions within the field of critical management studies (CMS) and within diversity studies, with decidedly less uptake in "mainstream" fields such as leadership studies (see, however, White, 2010; Nkomo, 2011) and strategy (see, however, Westwood, 2006). Its use has often been a critical one, i.e., using postcolonial theory to highlight epistemological and ontological limitations in how organization studies have attempted to create generalized knowledge without taking into account, e.g., differences in cultural epistemology or power-relations. For instance, Muhr & Salem (2013) use a postcolonial perspective in challenging notions of equality in a Swedish organization. By highlighting the often forgotten colonial history of Sweden, they show how a context often assumed to be one of the most equal and integrated ones in the world still creates images of 'the Other' and silences its own history in a manner that affect the ways in which foreign workers can align themselves to the 'openness' of the studied, Swedish company. In this way, postcolonialism can act as a critical lens into how our understandings and their cultural foundations are created and managed.

That said, it is notable that postcolonial theory or thinking has almost never been used to inquire into the knowledge systems of innovation studies and innovative thinking. In our literature review, we went through the five top journals in innovation, as listed by The Association of Business Schools (ABS), 2015: Journal of Product Innovation Management, Research Policy, R and D Management, Technovation and Creativity and Innovation Management. For each of these, we used the journal's full-text search for the terms "post-colonial," "postcolonial," "post-colonialism" and "postcolonialism" (the hyphen is sometimes used and sometimes not). The results were as follows:

TABLE 1

Journal	Keyword Search			
	"Postcolonial"	"Post-colonial"	"Postcolonialism"	"Post-colonialism"
1. Journal of Product Innovation Management	0	1	0	0
2. Research Policy	0	0	0	0
3. R and D Management	0	0	0	0
4. Technovation	0	0	0	0
5. Creativity and Innovation Management	1		0	0

The reader is here asked to note that we in this have had to trust the search engine and that there is always a possibility that insufficient indexing and glitches in the software have returned erroneous data, but some variations on searches, spread out over time, returned the same results. Also, and as a precautionary matter, we searched, in the same manner, for references to the works of three key postcolonial theorists: Homi Bhabha, Gayatri Spivak, and Edward Said. While this is of course not a complete list of possible postcolonial influences, we argue that the lack of references to these thinkers would be notable, as an article that attempts to introduce postcolonial critique would almost certainly have to refer to the seminal works of at least one of these, and most likely all three. The results of this were as follows:

TABLE 2

Journal	Authors		
	Gayatri Spivak	Homi Bhabha	Edward Said
1. Journal of Product Innovation Management	0	0	0
2. Research Policy	0	1	0
3. R and D Management	0	0	0
4. Technovation	0	0	0
5. Creativity and Innovation Management	0	0	0

It should here be noted that references to, e.g., Spivak are quite common in feminist theory, and Edward Said's influence in no way limits it just to postcolonial theory, making the fact that neither has seemingly been referenced or mentioned in Journal of Product Innovation Management even more interesting. As an additional side-note, not even Alexander Styhre, a leading critical innovation scholar who has published on postcolonialism (Styhre, 2005), uses any such references in his book-long attempt to form a social theory of innovation (Styhre, 2013). In this case, the lack of engagement cannot be explained by a lack of insight into the field, as Styhre most certainly has such. So, there is a silence in innovation studies, a silence regarding postcolonial approaches. Arguably, this is due to the more general lack of critical innovation studies (see, however, Sveiby, Gripenberg, & Segercrantz, 2012), as the field is often seen as one representing a general good, one where there is scant need to inquire into the ethical and cultural assumptions it builds on. This, as we will show, is a problematic view, and also one at odds with the professed ethos of the field.

A key, one might even say constitutive element, of innovation, is the capacity to borrow ideas from other fields. Looking to the literature, there is no end to the number of ways in which this can be re-iterated, as innovation scholars have returned again and again to the productive potential of utilizing insights from other fields. The capacity for divergent thinking and for being able to combine ideas from fields previously seen as separate is in the literature on innovation hailed as central to creativity and therefore foundational to innovation. Further, the innovation literature often comments very positively on the possibility of utilizing the insights of one field (e.g., business models developed in the service industry) in another (e.g., deploying the same in retail). In this manner, innovation discourse and innovation thinking quite often glamorize re-utilization of ideas from other fields.

However, the innovation literature, particularly the popular such, is remarkably silent regarding the politics of this. The notion of utilizing ideas from other fields is instead presented as not only a right but imperative for a person or an organization to be innovative. As the latter state is then presented as not only desirable but necessary for survival, the liberal colonization and appropriation of ideas are seen as a non-issue. This, however, is a problematic assumption, which rests on there being an equilibrium of power between fields and that exploitation is a non-issue. In some context, this might be a reasonable argument, such as when rich corporations in one industry learn from similarly rich corporations in another, but this is not always the case.

In contemporary management literature, there has been an awakened interest into viewing markets that were previously seen as marginal or without commercial potential. A lot of this interest can be traced back to a book by Indian-American business professor C. K. Prahalad, namely The Fortune at the Bottom of the Pyramid (Prahalad, 2009). This argued that although the five billion poorest people on the market were often overlooked by major corporations, they represented "vast untapped buying power" and that companies should attempt to create products for this group. The wretched of the Earth would then become

empowered consumers, get access to products designed to their needs, and companies could still profit handsomely. Although one might ask whether becoming a consumer is that great of a deal to the poverty-stricken and whether this truly is the promised "win-win," the book was well received in the business community and became a bestseller.

The interest books such as this garnered, combined with the impossible to ignore the rise of the Chinese and Indian economy, made groups that previously had been overlooked into potential markets. Spaces that had previously been colonized by invading armies and kept under colonial power by way of statecraft were now increasingly colonized by global mega-corporations instead, in what some called "corporate colonialism" (Banerjee, 2006). This covered a multitude of processes through with the corporate world could extract value out of, e.g., Third World countries, but also gave rise to notions of taking in inputs and learnings from fields that would previously have been ignored (see Chipchase & Steinhardt, 2013). In innovation thinking, this process lived up to and boosted the axiom of attempting to bring in ideas from different fields, and was therefore well received.

What has not been addressed, however, is how we are to understand the power issues inherent in major corporations searching for ideas and innovations among the world's poor, and the manner in which indigenous knowledge systems can be turned into corporate intellectual property. It is with this in mind we will look to a specific case of this, namely the phenomenon of jugaad, and the way it has become commoditized.

A Critical Intermission

As our aim in writing this paper isn't to present a specific case study of innovation, but rather to critically inquire into the manner in which indigenous knowledge systems can become commoditized and exploited by Western innovation thinking, it is, of course, important that we are open with our position. One of the authors is a Caucasian from Northern Europe, albeit from a country with its colonial history of oppression. The other is from India, albeit not from the rural poor that we are writing about and for. We can thus not speak directly in the name of those we are here using as an example of corporate and conceptual colonization.

That said, our task here is not to present an ethnography of jugaad, nor to position ourselves as moral arbiters or defenders of the oppressed. Whilst the latter is an admirable position to take, we do not feel that we can justifiably claim to be such. What we're doing in this paper is rather something akin to an intervention, a critical question regarding the manner in which ideas travel (Czarniawska-Joerges & Sevón, 2005) and get commodified, and the power-relations inherent in this. Thus, rather than claiming we are doing a full postcolonial critique of innovation, a task which while interesting and worthwhile would require far more space and depth of inquiry, we're merely showing a specific case in which such a critique is warranted and can serve to open up our debates about contemporary colonialism, the new forms thereof, and the ideology of innovation.

Jugaad as concept and phenomenon

To put it in the simplest way possible, jugaad is an indigenous knowledge system of innovative problem solving, normally utilizing very limited and repurposed means and mostly associated with rural India. As a word jugaad is part of normal discourse across the Indian subcontinent and is essentially a colloquial word of Indian origin derived from the dialectal jugat. One of the meanings of this is "contrivance" which can further be traced back to its Sanskrit form yukti, a term that can mean union, connection, or combination, but which can also mean contrivance, expedient, trick and so on (Monier- Williams, 2005). People who practice jugaad are sometimes referred to as jugaadu, and have in the Western interpretation of their craft been referred to as unlikely innovators, "positive deviants" (Pascale, Sternin, & Sternin, 2010) and, somewhat breathlessly, "modern-day alchemists" (Radjou, Prabhu, & Ahuja, 2012). In less flowery terms, they could be described as craftsmen working with very limited means, problem-solvers who are forced to make constraints work for them and improvise "satisficing" (Simon, 1972) solutions.

In their communities, jugaadu is used as a term for those who focus on solving real-life technical problems and who as a result may be trying out things which at times can seem impossible, naïve or even injudicious. This also highlights that jugaad is highly contextual and mostly non-replicable since the solutions devised to solve a local problem are created in an improvised manner by way of alternative utilization of resources at hand. A key reason for its emergence in India is because it provides for a survival strategy in a situation with widespread scarcity. One example of this, and possibly the origin of the Hindi term, relates to the brain-child of

a farmer in a small village of Gohana, Uttar Pradesh, who put together a "modest contraption" for transportation (Mitra, 1995) with the help of semi-skilled and semi-literate mechanics, mounting an old engine on a wooden body and using old tires. Soon variations of this improvised car became a mode of mass-transportation in the large countryside of north India.

We might also consider the case of Mr. Mansukhbhai Jagani, from Mota Devaliya in Amreli. To overcome the increasing difficulty of ploughing the land by the use of animals after the 1994 drought in Saurashtra, he repurposed a bullet motorcycle as a farming implement. In doing so, he managed to create a cheap, multi-utility farm device which has a leveler, a ploughing machine, a weeding device, and a sowing machine, all in one. The development of this made concentrated use of traditional knowledge regarding how to plough the land, inter-culturing, and the local sowing-challenges, and did so with the simple technology at hand. The indigenous knowledge of Mansukhbhai ensured a machine functional for its local deployment and has gone on to earned him considerable praise.

Other examples of jugaad, collected by one of the authors, include the usage of a washing machine as a mixer to create buttermilk and the repurposing of old cassette tapes, where rural villagers use the zinc tapes to polish metal-wares and shine leather to give it a smooth look. The jugaadu's approach to innovation is, therefore, more a process of re-thinking rather than pure invention. They "recycle, re-use, re-purpose, and remediate" (Leadbeater, 2014), and are continuously trying to find new uses for discarded, overlooked or wasted resource. This has led some to describe them as "inveterate tinkerers" (Leadbeater, 2014), and forms a key part of how indigenous knowledge emerges through the need to overcome a barrier or constraint. One thing which is strikingly evident from these examples is that there are these unlikely indigenous innovators – "positive deviants" (Marsh, Schroeder, Dearden, Sternin, & Sternin, 2004; Pascale, Sternin, & Sternin, 2010) (the Jugaadu in the study), "the outliers who succeed against all odds" (Pascale et al., 2010), who reframe challenges as opportunities, making constraints work for them and constantly adapt to an ever- changing environment by improvising to produce "satisficing" (Simon, 1972) solutions. These are "modern-day alchemists" (Radjou et al., 2012) who imaginatively transform adversity to their advantage by the practice of Jugaad. By reviewing many such examples, we further try to explain the important and necessary conditions/elements that we believe Jugaad is composed.

The Elements of Jugaad

ELEMENT	DESCRIPTION
Need & Creator	In case of Jugaad, the need and the creator for that need are necessarily one. This resonates with Murray (1938) who theorized need as something that impels an individual to act on that need.
Constraints	Two forms of constraints- external and internal. Two forms of constraints- external and internal thought to be possible. When we confront a barrier/constraint in a situation which prevents us from proceeding in our intended direction, but we do not want to be stopped, we deeply wish to act. This is a natural tendency of human beings – where some stop, others act.
"Esemplastic" Power ("Yog")	It is "a magical, synthetic power" (Coleridge,1817), which complements and bring together opposites. It is considered as an extemporaneous act of the mind.
Gestalt Image	The competence to be able to see the overall configuration/structure of the problem. Also, the Jugaadu searches for the clues for the conceptualization of the solution at times by either observing similar or related solutions existing.

Ingenuity ("Yukti")	A Jugaadu's formula of bringing disparate resources in a union that allows him/her to alter, process, and reconfigure the matter that surrounds him/her. Jugaadus generate and use ingenuity to control the implementation of energy to orchestrate the matter in their local environment (including materials and people) in some unique modus operandi with confidence that it will lead to problems resolution.
Resourcefulness	A mindset, defined as an ability and willingness to recognize and apply the available means at hand to alternative usage at times to address the problems that the person considers relevant in an unconventional manner.
Local (Indigenous) Knowledge	the knowledge that he/she has expanded over some time and continue to develop.
Improvised Artefact	A contraption
Time	to be considered as "in short time" rather than "short term."

The interplay of Jugaad Elements

Based on the content analysis of approximately 20 examples (including the ones mentioned), the elements were identified, and it was understood how the interplay of elements lead to a Jugaad solution. In the figure, we see how the elements mentioned above interact with each other.

In the figure, we see that there is a constant tussle between the need and the constraints, i.e., there is constant pressure on the need to escape from the force applied by the constraints. In other words, need is constrained by the lack of resources, lack of available mainstream solution, and other scarcity existing external to the jugaadu. Now, since the jugaadu in his local context within the boundary of the limitations/constraints have a certain freedom to operate and experiment, also along with his local knowledge starts thinking of alternatives. The moment he starts thinking of the alternatives the freedom and local knowledge helps in identifying a path or passage to escape from that pressure situation. It is a pressure situation also because this is a time-dependent need, one which the jugaadu cannot postpone for long. The moment the path is shaped by the local knowledge, jugaadu sees an opportunity to escape and work out an alternative solution. In the process of thinking the alternatives the Jugaadu's Esemplastic power of imagination which complements and bring together opposites in the form of a union leads to the generation of a gestalt image. The gestalt image created relates to "wholeness" – getting a complete big picture (like in the case of the automobile example where the jugaadu looks for something like a tractor) without focusing on the specific components. The jugaadu focuses on understanding the functionality of the different available parts or pieces in relation to the gestalt image of what is desired. Once the union is understood the local knowledge and the Esemplastic power helps in generation of Yukti – the formula which when applied in practice will bring disparate elements together. Now, the jugaadu uses his/her analogical thinking to put available resources and the needed resources to alternative usage by changing their functionality; it is like saying that a chair which was meant for sitting is now being used as a ladder and not for the function of sitting. Along with the Yukti and resource complementarity, an improvised artifact is achieved which is satisficing for the jugaadu. The artefact is the result of the improvisation that takes place when the design and execution of novel activities unite.

The following diagram explains the process of jugaad and its key elements.
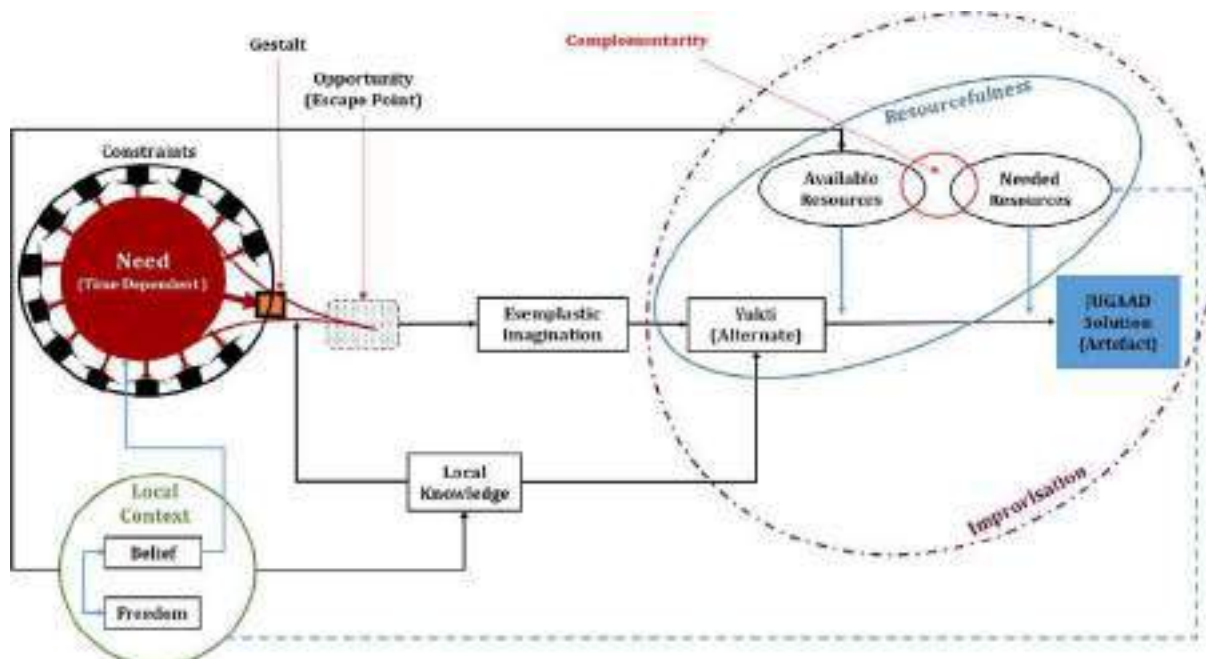
Figure 1, Interplay of Jugaad Elements

Another key element here is frugality – by need, not by choice. A common characteristic of the low income and poor group in developing countries like India is that of irregular income flows, which blocks them from getting involved in regular consumption or investments. This is particularly noticeable in situations where, e.g., a key piece of technology, such as farming or infrastructure equipment, breaks down without there being sufficient capital to replace it. We might note that researchers such as Yongnian (2004) has emphasized the specifics characteristics of Indian culture, including diversity, and this may be of some importance here. Indian culture is an amalgam of both indigenous cultures and several outside ones, cultures brought by traders, invaders, and colonizers. This has led to a contemporary Indian meta-culture which is highly diverse (Yongnian, 2004). Important to note here is that innovation studies, as well as the more popular discourse on the matter, always postulate a positive link between cultural diversity and innovation. Diversity is claimed to increase both the capacity for divergent thinking, a broader input of ideas and insights by way of having multiple perspectives on an issue or problem, and an improved scope for robust critical evaluation, leading to enhanced and more effective decision-making and problem- solving (Hennessey & Amabile, 1998; Bassett-Jones, 2005; Ozbilgin & Tatli, 2008).

Jugaad, this expedient contrivance, has in the literature on it been referred to in numerous ways. It has been called "creative improvisation" (Krishnan, 2010) or "making do" (Tully, 2011), as well as a mostly "makeshift arrangement" (Gupta, 2013). In their popular management book, Radjou, Prabhu, & Ahuja (2012) refer to jugaad as "the gutsy art of overcoming harsh constraints by improvising an effective solution using limited resources." It is also termed as an "improvisational approach of solving problems of self or others' in a creative way, at a low cost, in a short amount of time, and without serious taxonomy or discipline" (Brem & Wolfram, 2014). There is thus a malleability in the term and its usage. As a concept, it can be "reconfiguring materialities to overcome obstacles and find solutions" (Sekhsaria, 2013). Prahalad & Mashelkar (2010) describe this same phenomenon as the one of "developing alternatives, improvisations, and make-dos to overcome a lack of resources and solve seemingly insoluble problems." They, however, completely dismiss the term "jugaad" for what they call "Gandhian innovation" (Prahalad & Mashelkar, 2010) due to an assumed connotation of low quality. However, Vijay Mahajan of Basix, an Indian social entrepreneur refers to jugaad as the ability "to manage somehow, in spite of lack of resources" and argued that "the spirit of Jugaad has enabled the Indian businessman to survive and get by" in an economy primarily beleaguered by numerous controls and thwarted by lack of larger purchasing power (Mello, 2014; Cappelli, Singh, Singh, & Useem, 2010).

Regardless of the exact definition one prefers, jugaad is a term used for a complex group of creative and innovative behaviors in a situation with severely restricted resources, more specifically such rooted in the lived experiences of India, in particular amongst the rural poor. In this sense, jugaad can be understood as an indigenous knowledge system, a way to use innovation for survival in a situation defined by destitution. This

latter aspect is of course not unique to India, which has led to the emergence of a parallel term, namely "frugal innovation" (Brem & Ivens, 2013; Fukuda & Watanabe, 2011; Mukherjee, 2012; Radjou & Prabhu, 2013; Rao, 2013; Tiwari & Herstatt, 2012; Zeschky, Widenmayer, & Gassmann, 2011). Such forms of frugal ingenuity unsurprisingly exist in most if not all societies/communities with a poor populace with highly limited resources. We, however, argue that whilst jugaad can be understood as a form of frugal innovation, it is also a unique form of a local innovation culture, defined by its socio- cultural context and a knowledge system onto itself – which is why it in India has been afforded a special place and vernacular. This can, for instance, be seen in the social network of the jugaadu, who are not merely innovators that work with restricted resources, but a learning community (Wenger, 1998; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). As new forms of jugaad are developed, these are shared and re- deployed, and often adapted to other local conditions. Rather than merely seeing this as a specific form of cheap innovation, it could better be understood as a locally embedded set of practices and practitioners, one that can only be fully understood in the social and cultural context it emerges in.

That, however, is not how it has been received in global management thinking, nor the way it's been presented in business literature. For whilst one could argue against our interpretation of jugaad as separate from other forms of frugal innovation – or at least state that many other local forms of frugal innovation might be described in a similar manner – the fact is that innovation thinking has also presented jugaad as a separate phenomenon, albeit for very different reasons. In popular business books and the likes, jugaad has been used as a specific example, but not necessarily out of care for its cultural embeddedness. Instead, it had been co-opted as a tool for Western management thinking, and it is to this co-optation we shall now turn.

The Colonization of Jugaad

As previously indicated, innovation studies have tended to focus on Western corporations and Western notions of what constitutes innovation. This is now gradually changing to include nations such as India, China, and Brazil, as well as African countries (Petrick & Juntiwasarakij, 2011). This is driven by the growing significance of developing markets and visible in the marked increase in the literature on innovation in and from emerging markets (see Govindarajan, 2011; Hart & Christensen, 2002; Jana, 2009; Saraf, 2009). To some, this is a welcome turn away from Euro- or Americentrism, where the attention paid to innovation from rural areas in India is a way to give voice to the previously voiceless.

However, this is not the only interpretation. As previously indicated, the move to turn systems such as, e.g. jugaad into lessons for Western capitalism contains numerous problems. We will here highlight three such; a) the tendency for exoticization, b) the exploitative logic inherent in commoditizing indigenous knowledge systems, and c) the re-establishment of Western power. All three are central issues highlighted in postcolonial theory, and their inclusion here shows the key logics of colonialism – the marginalization of the non-Western Other, a process of exploitation, and the upkeep of existing and historical power-structures. We shall in the following discuss each in turn and conclude by discussing the implications for innovation studies and innovation thinking.

Exoticism and the Jugaadu

Let us return now to a few of the comments we included when introducing the concept of jugaad. We pointed out that in the existing literature, the jugaadu had been referred to by terms such as an "modern-day alchemists" (Radjou, Prabhu, & Ahuja, 2012). Whilst claims such as these can be read as non-disparaging or even lauding, they still work to present Indian innovation as something Other, something that the Western innovation researcher (or manager) should view as different and exotic. As Edward Said started to point out in his influential Orientalism (1978), there has in Western scholarship been a distinct tendency to present Eastern cultures as mysterious and exotic, different from the assumedly well-ordered West.

In the presentation of jugaad, as well as other forms of frugal innovation (Soni & Krishnan, 2014), this exoticization is in full force. Whereas Western innovators may be described as being brilliant or mavericks, their capacity for innovation is still presented as following logically from their innate genius. When non-Western innovators, particularly such who engage in innovation with scarce resources or come from a deprived background, are presented it is chiefly to marvel at the very fact that they have been able to innovate at all. Consider for instance the many ways in which Indian surgeons have managed to replace costly equipment such as Raney clip with paper clips or polypropylene mesh with mosquito net – both cases that have been highlighted in Western media. Whilst such substitutions are indeed clever; they do not

necessarily differ all that much from, e.g. the practice of wartime surgery. However, specifically, because they are done in India, and can be explained as part of some mysterious Easter knowledge – such as jugaad.

Here the reader might wonder whether we're not doing the same thing, exoticizing jugaad by naming it as a special case of frugal innovation. Such criticisms have value, but as we've previously stated, we have desired to understand jugaad not as an exotic, 'different' practice, but as a culturally embedded form of innovation that needs to be understood in context, not as a chamber of curiosities for Western readers of management literature. This as what the literature achieves by presenting the jugaadu in such a manner is to recast them as a modern version of the myth of the noble savage (Ellingson, 2000), where, e.g. the lack of education or even literacy is then marveled. Through this, the jugaadu are in effect presented to the Western innovation canon not as unique and worthwhile in themselves, but through their difference to an assumed default innovator. They are often poor, often rural, often uneducated, maybe even illiterate. In other words, they are represented as Other, exotic and oriental. Through this, they are presented as being defined specifically by what they are not, by their lack. They are "frugal innovators," and thus in a manner of speaking only innovators in this one, limited degree, while the West can still lay claim to being the default. They are represented as quirky marginalia, rather than a community and a culture.

Still, they at the same time represent strange hybridity, as this has been theorized in postcolonial theory by, e.g. Homi Bhabha (1994), in that this culturally specific learning community, native to India and specifically rural India, is also turned into part of something greater. By being turned into "innovation," and more than this, "innovation" that is relevant to the Western world, jugaad is translated into a hybrid form of knowledge, both local in practice and globally accessible through the wonders of international business literature, both inherently Indian and taught internationally through Harvard Business Review. It is to this translation we will now turn.

The Commodification of Indigenous Knowledge Systems

It is no wonder that jugaad, and similar forms of innovation, has been profiled in both the popular business literature and the international business press. Popular management thinking always borrowed heavily from whatever source it could, providing us with gems such as "Leadership Secrets of Attila the Hun" (Roberts, 1985) and books on learning innovation from gangsters (Clay & Phillips, 2015). That said, jugaad and the way it has been commodified affords us the possibility to interpret this through a postcolonial lens.

The most popular and well-known book on jugaad is Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth., published by Jossey-Bass in 2012 and written by Navi Radjou, Jaideep Prabhu, and Simone Ahuja. The two first authors also wrote a follow-up book, Frugal Innovation: How To Do More With Less, which was published by Economist Books in 2015. Particularly Navi Radjou has, on the back of this, become something of a management guru, and is active on the international speaking circuit. He is however not the only such to have tilled this specific field.

In addition to the already mentioned C. K. Prahalad, who focused on the wretched of the Earth as a potential consumer market, Vijay Govindarajan and Chris Trimble have published on themes remarkably jugaad-like, specifically in their 2012 book Reverse Innovation: Create Far From Home, Win Everywhere, which was published by Harvard Business School Press. To this comes any number of less known management thinkers and consultants who have addressed and/or sold similar ideas and concepts.

All of the aforementioned books on jugaad/frugal/reverse innovation, including C. K. Prahalad's have been very successful in the market. Further, they have afforded their authors lucrative speaking assignments, consulting jobs and similar. They, in effect, represent a process through which management thinkers have been able to translate the often-desperate hacks done by rural Indians trying to stave off starvation or worse into personal, commercial success. They have done this simply by stating that for instance, jugaad can teach valuable innovation lessons to major, often Western corporations, and then charged for these lessons. Judging by the success of only the books themselves (Jugaad Innovation has sold more than 100.000 copies according to its website), they have generated considerable value, one most likely multiplied by a considerable number through things such as speaking and consulting fees. The likelihood that any of this value has benefited the jugaadu is minuscule.

The books, as well as the publications spun off from them, have been published by global publishing houses with intimate connections to the Western corporate world. It is notable but not surprising that most of the authors referred to above are of Indian descent or have at least some Indian heritage. Most but not all work in

academia, mainly at major US or UK business schools, all of them consult. Few if any of them seem to represent the Indian rural poor. None of this would be very surprising from a postcolonial perspective.

Here, global publishing houses represent both a form of conceptual colonialism and a simple corporate such. By stint of their size, they are able to exert a major influence on contemporary business discourse, globally. They depend on authors and academics to act as conduits in this; a position sometimes referred to with the moniker "thought leader." From the perspective of a publisher, rural innovation in India is only valuable if packaged and represented in a way to appeal to the global corporate world. Here, however, the issue of legitimacy comes in. As so often under colonialism, an interlocutor is helpful, and well-to-do Indian thought leaders can be excellent such.

What should be remembered here, however, is the complex politics of the dispossessed. In books such as the ones referred to above, wealthy if at times Indian individuals with deep connections in Western institutions present themselves as speaking for a group that might, using Spivak's (and previously Gramsci's) famous term, be called "subaltern" (Spivak, 1988). Here, however, it is not the jugaadu themselves who are given a voice. Rather, they are turned into "innovators" to fit in with a Western perspective, and their stories then sold and retold to titillate Western business-men. Spivak, among other postcolonial theorists, challenged the right to do so, stating that there is no way in which such ethnocentric appropriation could truly give voice to the heterogenous body politic which is the struggling, rural poor. Here we need to acknowledge that we, the authors, cannot do so either, and only note how what may seem like paying attention to innovation in the developing world may also be a form of exploitation, one ultimately denying the jugaadu their voice.

Re-establishing Western Power

The overarching theme in much of postcolonial studies is the unfolding of how power is continuously re-established in a manner that positions the hegemony of the Western world. One might think that books that set out to glorify and valorize forms of innovation in a markedly different part of the world would not fall into this trap, but alas. Consider the following excerpt from Jugaad Innovation:

> *During the eighteenth century, homes in the United States were primarily heated by inefficient fireplaces that spewed smoke as much of the heat they generated escaped up the chimney. They were also hazardous, as their sparks could trigger fires that quickly devoured wood-built homes. Franklin's jugaad innovation to tackle this problem was a new type of stove with a simple hooded enclosure in the front and an airbox in the rear. The new stove and its reconfiguration of the flues enabled a more efficient fire, one that consumed 75 percent less wood and generated twice as much heat. The Franklin stove delivered ''more with less.''(Radjou, Prabhu, & Ahuja, 2012, pg. 7)*

Yes, no more than seven pages into the book ostensibly about the jugaadu we learn that in fact, long before they got the idea, an American – and not just any American, but one of the most foundational Americans of all – had in fact beaten them to it. Reading somewhat further we learn that:

> *America's founding fathers, as well its creative farmers, industrial pioneers, and scientific explorers in the nineteenth and early twentieth centuries—from Ben Franklin to Cyrus McCormick to the Wright brothers—were historic practitioners of jugaad in the West. (Radjou, Prabhu, & Ahuja, 2012, pg. 7)*

In other words, jugaad is presented not so much as indigenous knowledge or an ingenious innovation culture in India, but rather as a somehow forgotten path of innovation that the West has had access to all along. The jugaadu, then, is presented not so much as originators or creators, but more like bit players reminding America of the innovative powers it has held.

This is a variation of the theme of the noble savage, where the jugaadu is merely a conduit to a history of innovation, harbingers of a simpler time. Through a remarkable feat of rhetoric, the jugaadu get to see their lived experienced colonized not once but twice – first by business authors, then by US history. Something very similar can be found in Govindarajan & Trimble (2012), where the notion of learning from, e.g. rural India is primarily in order to shake major (US) companies out of their creative doldrums and to enable them to "win everywhere," in what might be called a Trumpian innovation policy.

And so, the postcolonial loop gets closed. First by exoticizing, then by exploiting, and lastly by pointing out that the true value still lies with the colonial power.

The Silences of Innovation

Our aim here, as previously stated, has not been to present a full postcolonial critique of a contemporary innovation discourse, as such a critique would easily fill a book. Rather, what we've attempted to analyze is the manner in which one form of culturally embedded innovation, jugaad, has been turned into fodder for Western innovation punditry, and what might lurk behind the superficially fawning presentation thereof.

We have done this in order to note how notions of innovation can become colonized and exploited and to highlight the manner in which popular innovation discourse continuously seeks out new things to commodify. Our aim has not been to claim that jugaad would be a unique case, as it is not. It is merely a practical case through which to highlight a more general problem, one where all forms of knowledge systems or learning communities are in danger of being turned into a bestselling innovation book.

Neither are we claiming that the contemporary innovation discourse solely needs postcolonial critique. Rather, we see that there is a need for multiple critiques regarding the manner in which innovation punditry and the attendant field of innovation studies chooses its questions and its examples. This would require an ideological critique of various strands, including but not limited to feminist and postcolonial theorizations.

In the end, our key point is as follows: The politics of innovation studies and innovation punditry needs to be analyzed, in depth. At the moment, we're seeing increased interest in learning from emerging markets, but this learning isn't necessarily as unproblematic or "win-win" as particularly the popular literature would have it. Rather, it can at worst be a form of colonization, of either the corporate or the conceptual variety. This also, in an odd twist to the tale, limits the innovation potential in the world. By seeing people like the jugaadu as valuable and worthwhile only if their indigenous knowledge systems can be translated to and utilized in a Western corporate logic, we risk missing deeper learnings about things such as intelligent re-use, circular economies, or simply understanding the deeper cultural meaning of innovation in context. As postcolonial theorists have long warned us about, in the hybridization process much can be lost, and in the presence of too many pundits speaking in their name, the subalterns may be quieted for good.

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Decolonising Namibian Arts and Design through Improvisation

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The research investigates the role of service design and improvisation as decolonising practice. It is based on case study research with a focus group consisting of Namibian artists, designers, artisans and arts organisations who participated in artistic and cultural exchange activities of the Art South-South Trust (ASST), a start-up Namibian not for profit (NFP) organisation. The goal of ASST was to increase visibility of the focus group members, enable global exposure and create an arena for multi-vocality. The paper creates a practical framework for decolonising practices in Namibian arts and design by drawing on reflective practice to analyse the activities of ASST alongside interview data collected from Namibian and Australian partner organisations and participants in the program. Critical thinking is used to evaluate the impact of realised activities and processes both in situ in Namibia and in exchange in Australia. This paper explores practices that can enable decolonising processes in Namibian arts and design spheres.

Keywords: Namibia, decolonising design, service design, improvisation

Introduction

The role of service design in the Namibian not for profit arts and design sectors received little attention in scholarly research. Notable studies, nevertheless, include the PhD thesis of Miettinen (2007) that investigated the role of culturally-focused service design in Namibian craft communities and tourism services, and Sarantou's (2014) PhD thesis, which mapped Namibian art and design through a postcolonial lens with a focus on narrative in practice, marketing and sustainability. In post-independent Namibia the art and design "world" (Becker, 1976, p.123) continues to grow and reinvent itself despite the country's three periods of colonisation that caused communities to live in isolation prior to independence in 1990 (Mans, 2003; Melber, 2003).

Namibian arts and design practices are influenced by two systems of knowledge (Palumbo, 2005). One knowledge system derived from the African cultures who are indigenous to Namibia, as well as those who inhabited the area before colonialism. The other system of knowledge is based on Western knowledge systems that infiltrated Namibia through the influence of missionaries and after 1894, colonisation (Walker, 2002). Both systems have contributed to bold innovations and reinventions, evidenced in areas such as architecture and cardboard printing (Palumbo, 2005). Therefore, the blurring of these systems occurred over many decades, but especially after the country's independence, the reinvention of Namibian identities inspired artistic creation, especially in art and design genres such as fashion, jewellery and textile design (Sarantou, 2014).

Namibian artefact making is holistic and makers are not distanced from their making processes and environments, nor from the textilities of their raw materials. Rather, they are deeply involved in their

procedures, materials and social realities during making (Sarantou, 2014). That is why Namibian artists and designer-makers regularly draw on, and learn from improvised processes, because they are regularly confronted with design problems (Sarantou, 2018). In Namibian design communities, making techniques are guided by experimentation on the one hand and traditions on the other. The wide use of improvisatory practices confirm Montuori's (2008) argument that improvisation is a forward going process of making that is underpinned by experience, traditions and risk taking during experimentation. In Namibia, improvisation is often a response to pressing demands and notions of "having to do what needs to be done" (Sarantou, 2014, p. 251; Sarantou, 2018). Recognising the role of improvisation in the sustainable development of Namibian arts and design, and documenting and learning from Namibian arts and design practitioners, would open up opportunities for new service developments that are lacking in this world. Paying attention and value to the improvisatory practice as an important function within design thinking activity, and in a context with limited resources, can redirect discussions of limitations to that of innovation. This would shift the position of local artists and designers from the discussion on "development" into the sphere of innovation and resourcefulness.

Namibian arts and design is generally not well represented in Southern Africa, let alone in the Southern African region or internationally (Sarantou, 2014). Some organisations and a few projects attempted to represent Namibian artists and their works internationally, but their practices were usually short-lived and thus unsustainable (Sarantou, 2014). Additionally, unsustainable practices are followed to support arts and cultural institutions and artists and designers. For example, the total national funding awarded by the National Arts Council of Namibia to local artists and designers for the delivery of new projects and work in the 2017/2018 period equalled 3,172,962.64 Namibian Dollars (around 200,300.00 Euro) (Namibian Arts Council, 2018; New Era Live, 2017).

Due to the lack of strong and well-coordinated research as well as policy development and implementation on a national level, an approach is needed that explores the needs of suitable services for Namibian arts and design worlds. Opportunities offered through online services remain largely untapped, with only a few organisations, businesses and individuals utilising technologically enabled avenues for representing Namibian arts and design. Thus, new service approaches are needed for opportunities that will sustain this world. Instead of tackling the problem top-down, this paper seeks to explore different possibilities for new services based on Namibian local knowledge and culture.

The question this paper addresses is: "How can the sustainable participation of Namibian practitioners in arts and design be enabled?" and "What kind of design practices enable decolonising processes with local Namibian communities?" The paper seeks to explore these questions through a case study of ASST that has the vision to grow Namibian art worlds (Art South-South, 2014). The Trust implemented an arts and design exchange programme between Namibia and Australia (2013 – 2017). The programme included collaborations with several Namibian and Australian arts organisations to facilitate services with Namibian artists and designers, including exhibitions, sales of their work, participation in artist residencies and the facilitation of art workshops in urban and regional South Australia.

Since the establishment of ASST the Trust initiated successful services to Namibian artists and designers, including a cross-collaborative exchange program that focuses on exhibitions, workshops and product sales. Similar to most NFP organisations, ASST faces strong competition in increasingly volatile product and service markets with increasing competition for donors' funds (Austin, Stevenson & Wei-Skillern, 2006). The first section of the paper provides a theoretical framework, a description of the case study and the data collection and analysis, followed by a discussion on the key findings.

Theoretical considerations

Decolonising design

Decolonisation continues to be informed by postcolonial critique (Venn, 2006), which "takes for granted the argument that the forces that established the Western form of colonialism and imperialism continue to operate, often in altered forms, through mutations in local circumstances, and through different apparatuses" (p.3). As an oppositional standpoint theory, postcolonial critique seeks to question dominant narratives and relationships of power that exist in various overlapping social forms that are marked by gender and "communalist ethnic oppressions" (p. 3). Tlostanova (2017) posits that the "Western/Northern" subject "occupies a delocalised and disembodied vantage point that eliminates other possible ways to produce, transmit and represent knowledge" (p. 52). Decolonising practices therefore needs to induce alternative

knowledge systems and ways of knowing. Moreover, research is underpinned by colonial power structures. It is "one of the ways in which the underlying code of imperialism and colonialism is both regulated and realised" (Tuhiwai Smith, 1999, p. 7). Therefore, research itself needs decolonising practices for sustainable futures. Daniels (2011) highlights the challenges involved in research that is executed by the 'North' in research fields in the 'South' due to the dominant structures that underpin academic research. The problem is well-defined as the reliance on "partial and so-called objective knowledge [that frames] the research at the expense of silencing voices and submerging data" (p. 7). Among other methods, the role of research based on storytelling and interviewing have become important in postcolonial contexts as it provides avenues for giving a voice to the participants.

For this particular article, it is essential to mention that design innovation has been argued to inadvertently perpetuate colonial and imperialistic ways (Tunstall, 2013). Tunstall highlights how these issues are reflected within design innovation practices, such as a) the segregation of 'traditional craft' and 'modern design', therefore ignoring other intrinsic forms of design innovation among local communities; b) the perception that design thinking is "a progressive narrative of global salvation" and ignoring "alternative of thinking and knowing" (p.235); c) by venerating European, Euro-American, and Japanese design; and d) the way design innovation project outcomes most often still prototypes, "[limiting] the positive impact on communities" (Tunstall, 2013, p.235). The author advances that "designers in India and Africa have creatively responded to the challenges posed to their communities, often in connection with processes of imperialism, colonialism, and neocolonialism" (Tunstall, 2013, p.236). Thinking about decolonising design practices highlights the importance of the agency question, asks for change, rethinking, reconsiderations of dominant perceptions and narratives, and, ultimately, the rethinking of our existence (Tlostanova, 2017).

Furthermore, decolonising design deeply embeds the values of feminist and postcolonial theories into design practices. However, Raghuram et al. (2009) suggest that designers need the "recognition of postcolonial interaction" by leaving responsibility open to the multiple meanings that it may adopt in various contexts, spaces and places (p.1). This opens up the questions around agency and careful considerations need to be given regarding who takes responsibility, and for what. Responsibility, especially of local actions, should be approached with a focus on "interdependence and coexistence [by making] apparent the potential connections between responsibility, care and power, at a variety of scales" (Raghuram et al. 2009, p. 23). For example, Hamdi (2010) posits that responsibility for the implementation of development actions should remain with the communities.

Service design and improvisation

Service design has developed within the last two decades, so it is still viewed as an emerging area in design. Rytilahti et al. (2015) describes the brief history of service design originating within interaction design and cognitive psychology. The theoretical landscape of service design includes the areas of value co-creation, design research, user experience, learning and citizen engagement as core competence areas of service design (Ryhtilahti et al., 2015). The service design approach has been recognised in the area of interaction design (Holmlid, 2009), design policy preparation and implementation (Jäppinen & Miettinen, 2015), social innovation (Jegou & Manzini, 2008; Meroni & Sangiorgi, 2011) and business service experience design (Kukk, Leppiman & Pohjola, 2015). These developments lead to the versatile theoretical landscape of service design.

Service design is a strategic activity (Sangiorgi, 2012; Wetter-Edman, 2012) that helps develop and manage the service experience. The field has become a conceptual platform for holistic user-centric development work, in which both internal and external stakeholders of organisations are involved in the earliest phases of the design process (Miettinen & Koivisto, 2009; Miettinen, Rontti & Jeminen, 2014). As service design addresses projects in a holistic and user-centered manner, co-creation is also a fundamental aspect of the practice (Stickdorn et al., 2016); this is reflected through a multitude of methods used by professionals. Indeed, as put forward by Corubulo, Selloni and Seravalli (2018), the complex socio-technical contexts of designing services call for engaging and participative approaches that involve multiple stakeholders.

For instance, Participatory Service Design (PSD) can offer new models for improving local development for social innovation. It helps in considering economic development, policy development, strategic management, contextual understanding of the development setting, the sense of ownership and commitment when working with social design and innovation, and design that enables societal change (Miettinen, 2007). PSD manifests itself as a collaborative activity (Sanders & Stappers, 2008), in which power relations are carefully considered (Ehn, 2017) and the designer's role is facilitative (Howard & Melles, 2011). Thus, PSD can be an effective

medium both for marginalised communities to voice their stories and for members of the mainstream society to educate themselves about issues that are important for communities existing on the peripheries.

Furthermore, the role of improvisation in the development and performance of services is acknowledged (John, Grove & Fisk, 2006; Penin & Tonkinwise, 2009; Edvardsson, Haglund & Mattsson, 1995). Improvised outcomes, including services, are determined by a various set of choices made along the journey. Improvisation is 'embedded in the context' of the performative (Lewis & Piekut, 2016). This, it can realise, through action and reinventions, new user journeys. Improvisation offers exciting solutions to design challenges due to the unspecified process paths participants will embark on. Improvisation is 'path dependent', thus it can unfold in a myriad of ways and possibilities (Burrows & Reed 2016, p. 397). This is why improvisation is an increasingly popular action approach in service design user journey workshops and experiments when new services are developed with users and communities.

Again, improvisation is strongly associated with problem solving and acting in the 'now' or in a moment of time (Peters, 2009; Montuori, 2003; Nachmanovitch, 1990). In organisational theory the value of improvisation is recognised as a flexible, more informal approach that includes members of the organization in problem solving through acting in real time to develop strategies or structures (Ingram & Duggan, 2016). Thus, teams can explore real options, in real time. In doing so, participants are more likely to consider alternative and perhaps creative options as they draw on ideas that are usually unfamiliar at the time. Improvisation depends on the affordances in the environment (Richards, 2006, p. 381). This means that problem solvers can only work in the present moment with the options available in their specific environment.

Sennet (2008) briefly discusses improvisation as an avenue for makers to 'mark their presence' in a place or space, whilst it also involves 'skills that can be developed and improved', allowing people to better negotiate borders and edges (p. 237). Richards (2016) links improvisation to experimenting, explaining that improvised experiments afford lessons and stimulates learning. Similar to Sarantou's (2014; 2018) argument, Richards (2016) illustrates the role of improvisation in shifting cultivation in Sierra Leone. He argues that improvisation is contrasted with organisation and planning, but the purpose of improvisation is often overlooked, which is to bring together and solve incompatibilities and unfamiliarities. Consequently it is associated with long term survival strategies (Richards, 2016) and responses to pressing demands (Sarantou, 2014). For these reasons, the paper suggests that improvisation is a promising decolonising method to be explored in design processes, as it can induce alternative knowledge systems, plural ways of knowing and learning, in addition to enabling the negotiation of peripheries.

Case study method, data collection and analysis

The purpose of a case study is to establish rich and in-depth understanding of phenomena that are usually ill-defined in a real-world context (Yin, 1981; Yin, 2017). This method can enable better understanding of the needs of research participants and their organisations (Flyvbjerg, 2006). Case study methodology is based on investigating related situations – the differences between "what was planned and what actually occurred" (Noor, 2008, p. 1602), thus the paper seeks to gain insights into how the activities of ASST were experienced, which may inform decolonising design practices. The case study will consider how the user experiences of the research participants can enable sustainable services that drive participation in arts and design in postcolonial contexts. Primary data was collected from interviews while secondary data was retrieved from desktop search. The use of interviews enabled an analysis of the participants' expectations and enabling the Trust to gain an understanding of their experiences. The primary data was collected in two phases from two different focus groups. The selection of these two groups was motivated by the current collaboration of the Trust with Namibian and Australian arts organisations in facilitating artists from both countries. Data collection tools used were semi-structured interviews focusing on the perceptions, needs, expectations and past experiences. The participants and the researcher were geographically dispersed between Australia, Africa and Europe, resulting in the need to conduct interviews via mobile phone and the internet, lasting 20 to 40 minutes per interview.

The required ethical considerations for seeking appropriate consent and de-identification were followed as the research was conducted in a postcolonial context. Two focus groups were interviewed. The first focus group consisted of five participants at management level of various organisations, such as Trustees, gallery or program managers from different arts organisations that collaborated with the Trust. Thus, one participant from all the Trust's partner organisations between 2013 and 2015 contributed to the research. The second focus group consisted of ten participants, including past and present beneficiaries of the Trust from various demographic groups. The sample size represents more than 70 percent of the Trust's total beneficiaries since

its inception, but this number is not representative of the Namibian arts and design world. Interpretation of the qualitative data from the interviews were used to develop theme-oriented readings of the data. This generated complementary responses from participants, the data, which were treated simultaneously as a resource and a topic for exploration (Hammersley & Atkinson, 2007). Thus, systematic open coding (Burnard, 1991; Berg, 1989) was employed to identify recurring themes and patterns within the data.

Findings focus group 1: Need for awareness and open dialogue

Organisations that supported ASST usually negotiated three complex cultural market segments that includes a) artists, designers and groups; b) donor and partner organisations; and c) the wider audiences. The views of the audiences were excluded from this research as ASST's services are rather targeted towards Namibian and Australian participants and organisations. Participants from focus group one understood the role of ASST to provide opportunities for Namibian participants in facilitating cultural collaboration, artist residencies, exchange and product sales. Two participants in this group believe that the role of ASST depends on its future vision. Collaboration opportunities included the facilitation of art workshops, residencies, exhibitions, skills training workshops and participation in art prizes, markets and fairs. This focus group further understood the role ASST as to assists Australian and Namibian based organisations to facilitate participants' exchanges between both countries while retaining both regional and urban foci. Services that were valued and needs identified by partner organisations were the consultative services received such as the identification of participants for selection in residencies and exchanges. One participant from focus group two said: "I would have no idea that such talented participants existed in Namibia if it wasn't through the Trust and I also would have no idea where to look for these participants" (participant, Port Augusta, 2016).

The motivations for participation were that ASST succeeded in mobilising funding opportunities for activities and programmes, and continued to assist participants with art and design services related to exposure. Additional motivation for collaboration was the research and publication focus of ASST as well as more practical skills development, training and consultation services. A participant from a partner organisation in Australia mentioned that "benefits for regional galleries and participants are huge as they are often inward focussed and lack broader and international exposure and the cultural collaborations offer inspiring experiences that motivate participants to explore new ideas, techniques and experiences to grow professionally" (participant, Port Augusta, 2016). The participant added that "the Trust achieves outcomes despite limited funding which is a creative process in itself as the Trust's management team has attitudes that are conducive to creative problem solving" (participant, Port Augusta, 2016).

Expectations of ASST from focus group one, the arts and design organisations, were to uphold communication, to share costs of activities, provide advice and guidance to both Namibian and Australian partner organisations in areas of nominating suitable participants for collaborations and exchanges. Additional expectations of ASST were to enable the participants to grow through the facilitation of artist exchanges, residencies, artist talks, workshops, skills development, learning and professional development opportunities, including gallery visits and to liaise with the Namibian Ministry of Education, Art and Culture (MOEAC) to design creative strategies and SME development. Another participant from an Australian partner organisation commented that "[their] expectations are to enter into open dialogue so that there are honest selection processes so that [they] can find common goals" (participant, Adelaide, 2016). This participant also commented that the "de-motivators would be a lack of open discussion" (participant, Adelaide, 2016).

Moreover, a participant from a Namibian partner organisations suggested that the "ASST has expertise in and a focus on Namibian Indigenous knowledge in arts and design and this potential should be harnessed to market Indigenous arts, create employment and uplift Indigenous communities" (participant, Windhoek, 2016). Another argued that "benefitting participants should be more proactive in delivering informative talks, sharing information about their residencies and experiences – this should be a requirement of the Trust" (participant, Whyalla, 2016). Two others suggested that the Trust be more involved in consultancy and research activities as it will benefit the larger Namibian art world and attract attention from donor organisations. One added that "collaboration with academic institutions is valuable as it steers away from purely artist-focussed activities, moving the focus to regional and marginal communities instead" (participant, Whyalla, 2016).

A participant from Namibia identified various needs of the Namibian government related to the arts, such as providing expertise to educate, arts curriculum development for Namibian schools and consultancy that would lead to growing Namibian urban and regional arts communities. The participant mentioned that there is a

need for manpower and experts that have program knowledge to provide quality consultancy to individual participants, craftspeople, designers and art, craft and design groups, businesses and organisations in order to sustainably grow Namibian art" (participant, Windhoek, 2016). Additional suggestions were to engage with MEAC to develop materials and publications for schools and the wider public to stimulate audience participation in the arts in Namibia. Although these are valid needs that were identified, some of these expectations were unrealistic considering ASST is a small private Trust with limited resources.

Findings focus group 2: Plural identities and textured worlds

The data collected from this focus group illustrated the complex social, economic and cultural environments in which the participants live and function. The participants from focus group two were from various age groups - later twenties to early sixties. They earned monthly incomes that varied between less than NAD 5,000 and more than NAD 25,000. Six participants generate (mostly their primary) income through art teaching and lecturing, one worked as an arts administrator and another as an arts and design proprietor, while two worked in fields that are not related to the arts. All participants use the internet more than five times per day, while only one use the internet more than five times per week. The participants access the internet through their personal and work computers, mobile phones and tablets, which indicates their active connection to local, regional and global digital and social networks. Most work from personal computers and mobile phones while just over half of the group use work computers. Only two used tablets.
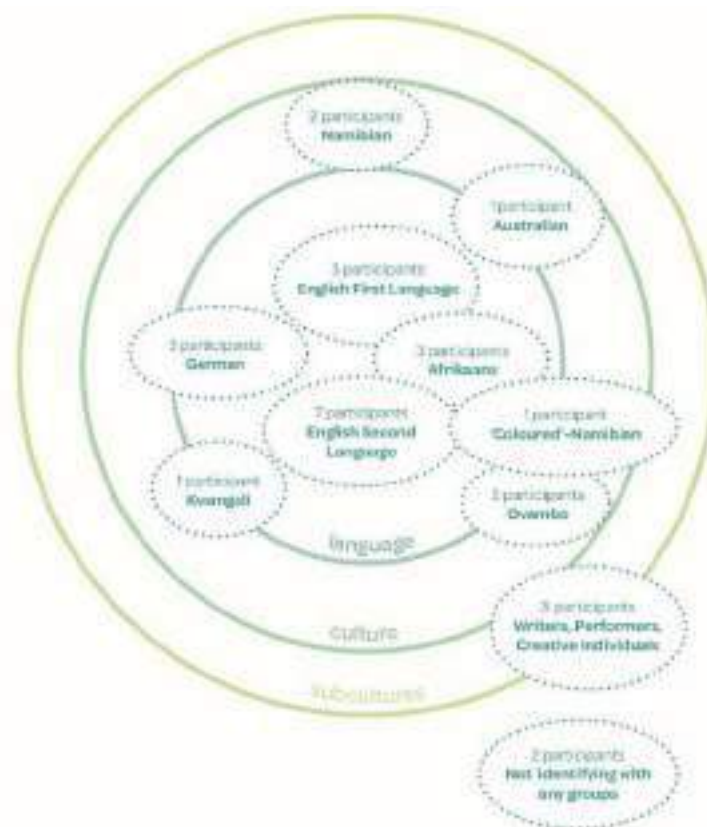
Figure 1: The fluid and plural cultural landscapes of focus group two. source: Beaulé and Sarantou 2019

The participants had multiple fluid and layered creative and cultural identities and roles (Figure 1). Only ten participants were interviewed, but their identities were mixed and overlapping. For example, seven participants identified as artists, while six identified as designers, four as makers, one as an artisan and another as a painter. Participants identify with diverse and hybrid cultural backgrounds. The ones mentioned were Namibian, Ovambo, Kavango, 'Coloured'-Namibian, English-Namibian and German. Two participants preferred not to identify with any cultural group or subgroup. Only three participants use English as their first languages and others used Oshivambo, Kwangali, Afrikaans and German. Figure 1 illustrates the interconnected, plural and layered identity formations of the participants.

Expectations of focus group two were to promote Namibian artists and designers globally through sustainable links with art and design organisations, providing feedback to participants and the broadening of knowledge and experiences. Sustained engagement with international markets, efficient, yet flexible and agile management protocols were suggested. A Namibian participant suggested that "it will be great if contracts are in place that address the selling, commissioning, shipping, administrative and taxing arrangements of the work" (participant, Windhoek, 2016). An Australian participant expressed expectations: "The opportunity to work alongside international participants, to build an understanding of their cultural backgrounds, including artwork which stems from these cultural backgrounds" (participant, Adelaide, 2016).

The motivations for participation of group two were the promotional opportunities that ASST globally through sustainable networks with arts organisations. ASST provides feedback and new networks to participants, thus broadening their knowledge and experiences, while it also engages with and educates Australian audiences about Namibian arts and design. A Namibian participant identified as demotivating "too demanding programs, and a loss of energy and drive when one person gets too overburdened, and ASST coming up with ideas and projects that do not materialise" (participant, Windhoek, 2016).

Figure 2: Namibian artist Petrus Amuthenu demonstrating his cardboard printing technique to South Australian Aboriginal Artist Sherrie Jones during a cultural exchange workshop at Arts Ceduna in South Australia. The initiative was supported by ASST, Country Arts SA, Streaky Bay Regional Council and Streaky Bay Tourism. source: Sarantou 2016

Needs, wishes and ambitions of the Namibian artists and designers were identified, especially those related to the recognition and exploration of plural and changing identities of the artists and designers. More fundamental needs included the fostering of an understanding for the work and artists and designers, having respect and stay true to the vision of the artists and designers and not trying to change their identities or those of their works. Participants indicated obvious needs that relate to good working relationships, getting the art and design "out there" through good management and marketing practices. Important needs also included the artists and designers in the processes, providing feedback, be reliable and flexible and assist with digital-based exposure that compliments the work. The participants pronounced resistance against the usual service systems that only focus on profits.

The needed services identified by the participants were the marketing and selling of work, the availability of platforms to showcase work, and assistance with the development of promotional tools. The participants acknowledged that arts and design services require expert knowledge as they are not regularly consumed products. The participants also noted that the services should be as creative as the products. All participants think that cultural exchange is a potential service that enables exposure, the sharing of new ideas, knowledge, techniques and approaches, next to fringe benefits that may include travelling, product sales, opportunities to teach and conduct training workshops (Figure 2). Knowledge is shared back in the home country with other artists and designers, which prevents isolation and encourages cross pollination of best practices.

Benefits of working via a service agents included the reaching and connection with wider audiences and networks, thus growing marketing platforms. The challenges of employing a service agent would be that participants are more removed from selling process and this may impact negatively on the product, whilst service approaches that are limited to a profit focus were thought to be unsuitable. The negative perceptions of arts and design services (e.g. marketing) were that they are a nuisance, taking up too much mental space and energy that should be invested in making/producing arts and design, while they are time consuming and expensive to develop. Participants lacked the expertise to promote themselves successfully, because art and design is often personal. Moreover, Namibian markets are limited due the country's relative small population, thus participants are frustrated by the lack of arts and design services in the country. It was widely acknowledged that Namibian markets are often informal, as wide cohort of Namibian artists and designers do not take business very seriously.

Discussion

The partner organisation that collaborated with the Trust, highlighted the need for awareness of Namibian arts and design that can be supported by timely, continuing and open discussion. Two of the authors, who are experienced in working with this world, can report that this is often not the case. Communication and open discussions within the Namibian arts and design world falls short between institutions and individuals due to the power structures. One of the primary shortcomings of this world are the limited funding and representational opportunities for artists and designers. With the National Arts Council of Namibia (NACN) currently being the primary funding body of all art forms, and considering the limitations to national funding, many individuals are demotivated to engage in open discourse or participation in the arts. For example, artists report that they are not participating in the annual NACN funding round as they lack information about the funding and find the application process overwhelming and tedious (Shapwanale, 2014). Again, the authors, who are experienced and have been successful in seeking arts funding, can report that, compared to funding application procedures in Europe and Australia, those of the NACN match in timeliness and have similar requirements.

Many additional power structures play a role in this world, and apart from the more obvious struggles with Namibia's social, political and economic realities, other challenges relate to institutional politics and gatekeeping in the arts that cannot be denied. At government level the drive for policy implementation and deep insights into the realities of the Namibian arts and design world lacks. For example, research has illustrated the weakness of the Namibian arts and design market due to a small population and an overflow of foreign artefacts (Sarantou, 2014). However, in performance agreement between the Namibian government and the MOEAC, arts and culture is only promoted nationally and regionally, but not internationally (Ministry of Education, Arts and Culture, 2017). Such inward-looking approaches stifle new and sustainable development opportunities for this world and that of Namibian artists and designers who mostly are marginalised economically and socially. The ongoing lack of knowledge about the talent that Namibian artists and designers have, as the data of this paper illustrates, further undermines the sustainability of this world and its

practitioners. It is thus clear that the Namibian arts and design world, especially at institutional level, is in need of structural change in order to meet the needs of its local users. The data collected in the case study demonstrates an opportunity to use service design as a catalyst for sustainable development of creative industries through improved services that enable viable economic and social models through decolonising methodologies.

The Namibian artists and designers had to manage their multiple identities as they are relatively transcendent, fluid, overlapping and context sensitive (Lawler, 2008; Appiah, 2007). They negotiate and make sense of their identities through complex processes, such as combining and changing identities, which are not necessarily clear-cut and smooth. Many have to navigate their life realities that are continuously influenced by postcolonial histories (Sarantou, 2014). Many individuals negotiate contradicting identities and roles, since they are formed between, rather than within persons (Lawler, 2008). The Namibian artists and designers are immersed in specific social, economic and environmental contexts that are influenced by institutional power structures and the sad reality of social stratification, alas the result of class rather than race-based segregation after the abandoning of the Apartheid regime in Namibia (Winterfeldt, 2010). The participants live their lives as they unfold into the myriad pathways of their textured worlds and art and design practices.

Unsurprisingly, Namibian artists and designers are well-connected to the internet with mobile phones being the most popular tool for having access. Due to the usual lack of fast and efficient shifts in institutional and organisational life, the internet and digital participation offers new opportunities to this world. The threats posed by the internet to privacy and copyright issues are widely acknowledged, yet in the stifling institutional environment of this world, Namibian artists need to rely more on their own resourcefulness and development. It is here that improvisation, co-creation and service design offer new opportunities to this world. New digitally-enabled services can be developed reasonably inexpensively with the help of the internet through avenues such as social media, blogs, websites and sales platforms. Moreover, improvisation opens the door for processes to include different ways of knowing and being, through the involvement of multiple stakeholders and users. This will enable the shift from colonised minds and bodies (Nandy, 1989) into decolonising practices into the sphere of innovation and resourcefulness. Important to mention, however, is that Namibian digital sales platforms that currently exist are undermined by the power structures associated with the Namibian shipping industries that are working predominantly in sync with the South African transport ecosystem. Thus, the costs for international consumers of Namibian art and design is phenomenal. For example, a printed work with a price tag of NAD 1500.00 will have a shipping cost of NAD 2800.00 (START Art Gallery, 2019). These cost structures can be verified by the authors who dealt extensively with the shipping of Namibian artefacts. Here is one example of a challenge that may shift from having a negative impact to a new opportunity for participatory service design and improvisation to solve incompatibilities and enable long term survival strategies (Richards, 2016).

The paper presents a practical framework that seeks to enable sustainable practices, resourcefulness and long term survival strategies. Hence, a practical framework for decolonising practices in Namibian art and design is to:

- Decolonise art and design worlds through a mindful and enacted shift from stifling institutions to a willingness to erode and fight power structures associated with institutionalisation. This includes working against rigid gender, traditionalist and inward-focused ideologies sedimented in Namibian government and institutions and which restrain open discourse and co-creation. Additionally, the minds and bodies of Namibian arts and design practitioners needs to be ongoingly decolonised from the oppressive social and economic shortcomings that are presented by everyday life, towards proactively engaging in initiatives that focus on local knowledge and culture.
- Embrace service design as a solution to and implement new service strategies that are based on plural avenues, digital participation and technology-driven solutions. The participatory potential of service design should be used to explore different avenues and drive the inclusion of Namibian arts and design into an international arena. Decolonising design innovation methods should also be used in order to acknowledge and include local and already existing innovation processes. Because these as still emerging practices, this case study could help develop decolonising design methodologies.
- Acknowledge the importance of narratives and digital storytelling in rendering audible and visible Namibian artists and designers by the sharing of Namibian local knowledge and culture according to the terms of the artists and designers, such as "our cultural significances that is told by us and explained by ourselves". Digital storytelling and connectedness to new (virtual) networks will get

Namibian artists and designers 'out there' so that their talents can be harnessed for new economic opportunities.

- Adopt bottom-up approaches and the role of improvisation and knowledge stemming from local contexts and from there on, develop and publish best practices charters as some artists have unrealistic expectations from support organisations (Shapwanale, 2014). The new initiatives (mentioned above) should be improvised as the approach incorporates, by definition, ongoing learning, experimenting and fine-tuning of results, which fosters approaches that are based on local knowledge and culture.
- Engage in the fight against exclusion through open and ongoing discussion in addition to embracing co-creation amongst artist and designers. An equally local and international focus will build new networks and markets as the focus will be on mutual enactment of goals and strategies. The impact of digital participation in addressing the needs for connectedness amongst marginalised communities is illustrated in the literature (Davis, Waycott & Schleser, 2019; Sarantou; Akimenko & Escudeiro, 2018).
- Foster capacity building in areas of service design, digital participation (including digital business management and marketing) and digital storytelling. This may enable the control over processes that many of the participants mentioned as a pitfall for having marketing agents and other 'outsider' service providers involved.
- Engage in ongoing research that embrace arts-based approaches and narratives. These approaches will be suited to the cultural complexities and mixed identities that many Namibian artists and designers deal with ongoingly. The research should impact policy development in a variety of sectors in Namibia, but it will also address the lack of deep insights and understanding within this world.

Conclusion

Sustainable participation of Namibian practitioners in arts and design can be enabled through improvised processes, participatory service design that harnesses the potential of technological and digital tools and processes. Opportunities for service design, based on co-creative approaches, may offer new opportunities if the narratives and stories of Namibian artists and designers are diffused and dispersed, impacting on and stimulating new initiatives for products and services. Service design based on digital participation will also harness new economic opportunities whilst the cultural meanings of the Namibian arts and design world will be explained through vocalised and visible initiatives. Current on-line marketing and sales initiatives are limited by weak shipment infrastructures compared to global networks, which needs remedy.

The kind of design practices that enable decolonising processes with local Namibian communities include improvised processes that focus on local knowledge and culture and acknowledging their existing innovation processes. Additional practices are those focusing on services that address colonial organisational structures upholding traditionalism that do not sufficiently stimulate improvisation and experimentation practices that usually derive from the bottom up. Weak funding structures for arts and culture results from weak policy implementation. Decolonising design is an avenue for new service solutions, self-determination and acting through self-selected avenues. Suitable multi-channel strategies need to be developed by the artists and designers themselves. The strategies could be based on plural avenues, including those of self-services and network building, to sustain this world. Art and design managers should adopt decolonising practices in arts and design representation. Their focus on contributing to the capacity building of practitioners, encouraging bottom-up approaches that answer to local solutions, and the facilitation of sustainable services for sustaining this world, are pressing needs.

Acknowledgements

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Understanding Development Discourse through Ontological Design: The case of South Korea

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Discourse is a powerful way of understanding/forming the world. It consolidates/disassembles society by conforming/disarticulating. However, the work of discourses has not been explained sufficiently in terms of design theory. In this respect, this paper aims to explore how the work of discourses can be understood in relation to the concept of ontological design, especially from the perspective of coloniality. The case of South Korea's development experience around different types of development assistance strategies was used to interrogate this question. A hermeneutic approach and discourse analysis were adopted for the empirical analysis. The research found the designed development assistance strategies of the "West" design back the development thinking and new development assistance strategies in South Korea. In doing so, the country replicates the "West-centred" discourse of developmentalism. From this, we conclude that discourses are shared through the ontological practices of designing. This informs design studies of how discourse relates to design.

Keywords: Ontological design, Discourse, Developmentalism, Coloniality, Hermeneutics

Introduction

A certain order of discourse produces permissible modes of being and thinking while disqualifying and even making others impossible (Escobar, 1995, p. 5).

Discourse is a selective way of understanding/knowing the world (Escobar, 1995; Krippendorff, 2005). As Krippendorff (2005) identified discourse *(re)draws boundaries* "between what belongs and what does not" (p. 23) and *creates conceptual frameworks of society* by (re)justifying its identity. Because of this selective nature, tending to exclude others, discourse always contains the concept of 'power' (Escobar, 1995; Kim, 2015). However, the boundaries of discourses do not stay in fixed forms. They are rather permeable in ways of being consolidated or rearranged, or even replaced by those of stronger discourses, as they interact with different issues in society (Krippendorff, 2005). Therefore, studying discourse with respect to social issues is significant to understand how our material/immaterial world is (re)formulated: discourses consolidate society by conforming the existing framework of the issue or disassemble a social order by disarticulating/reconstructing. As Mignolo (2011) stated, discourses (re)construct power relations in society by pursuing certain "set of rules" (p. 50) (boundaries).

'Development discourse' or 'developmentalism' is one of the powerful hegemonic discourses forming the contemporary world. Developmentalism is a political consequence of 'development assistance strategies' designed by American or European power in the mid twentieth century (Dirlik, 2012; Du Pisani, 2006; Kim, 2015; Sachs, 2017). The discourse was based on a missionary task of the "West" (countries in Europe or

Northern America) to enlighten the non-West who are "less-developed" (Ndlovu-Gatsheni, 2013). From this conceptual framework, depending on how much money a nation earns and how industrialised it is, the global societies coined new names such as "developed", "developing", and "underdeveloped" (Escobar, 1992; Esteva, 1992). Developmentalism does not remain in the state of being designed. Instead, it shapes the people's understanding of development and the world they live in and even leads society to design another form of development centred outputs. Kim (2015) found that developmentalism generalises the history of "West" as an ideal or a normal state of the world that defines "developed-ness" and gives power to those "developed countries".

In this respect, developmentalism was widely accepted by international society especially by the countries in the non-West, who have faced economic crises, after they achieved political independence after the Second World War (Kim, 2015). South Korea is one country that was influenced by the national and international increase of development regimes and the global discourse of developmentalism (Kim, 2013).

This research proceeds from the position that the relational work of discourses are related to design. We often consider that designed things remain in the state of 'being designed' solely directed by human intentions and disregard the consequences they can bring, so the performances of discourse have rarely been connected to the theories of design. However, discourse insidiously relates to and pervades every being including design. Despite the conventional understanding of design, which emphasised its functional aspects (Simon, 1996), the new era of design studies has begun to acknowledge that the essence of designing is on the *philosophies (discourses)* that underlie its performances (Buchanan, 1992). Building on this perspective, design scholars have conceptualised design in the context of ontology: design *formulates the 'world'* that we are living in and what we have designed is *designing 'us' back*. Discourse resembles the ontological practices of design as it influences things around it and (re)produces artefacts through the relations with other discourses. For this, Krippendorff (2005) remarked discourse as a "design problem" (p. 22) who works in active and recurrent practices. First, discourse constructs all kinds of artefacts from literacy to abstract theories, cultures and even to material products and places within the people who produce/consume it. Second, discourse repeats its practices by shaping individual experience, generating conceptual direction of society, and producing artefacts that exemplify the formers. Likewise, this study understand design is enmeshed with the work of discourses in a "redirective" (Fry, 2017, p. 30) way to shape human beings and their world, encompassing the relations between designed thing, its users, and a society. Since the subject was hardly studies hitherto by design scholars, an empirical investigation of understanding the work of discourses through the language of ontological design, especially from a political perspective, might be useful.

This research aims to explore how the colonial discourse of developmentalism might be understood in relation to ontological design. To achieve this, the study asks, '**how can ontological design theory relate to discourses of developmentalism?**'.

We have two expectations from this research. First, this research will contribute to understanding of *ontological design and its practices* by investigating an empirical case of South Korea. We expect this research will provide a more practical explanation of how design takes part in implementing and creating discourses. Second, by navigating the unequal global order through the discourses of developmentalism this research will provide insights on *the politics of design*, especially in terms of *decolonisation of design*. Since the subject is rarely investigated by design scholars, this study will respond to a need for critical scholarship into power imbalances and their relation to design.

In the following parts, we will introduce the key literature related to our research topics of design and developmentalism, explain our research design based on hermeneutics and case research, show the case results based on South Korea's development story and provide discussions and conclusions with respect to design theory.

Literature review

Theory of design
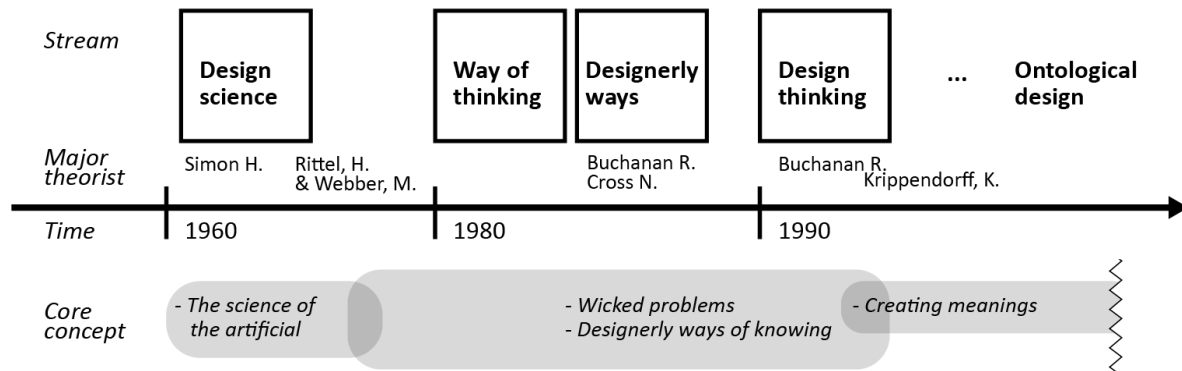
Figure 1: An overview of the history of design thinking

Design in the past emphasised the functional aspects of design to solve immediate problems and developed the idea of "science of design" to apply the quantitative methods of natural science to design practices (Cross, 2001; Cross, 1993; Cross, Naughton & Walker, 1981; Huppatz, 2015; Johansson-Sköldberg, Woodilla & Çetinkaya, 2013; Simon, 1996). However, as the inherent differences between science and design have been demonstrated by design researchers, design started to be understood as an independent area of study differing from science. Unlike science, design aims to achieve practical goals through action or solutions; uses various types of knowledge such as craft, design, organisation, and management; and takes place in commercial or organisational contexts (Archer, 1979; Cross, 2001; Cross, 1993; Cross, 1982; Naughton & Walker, 1981; Krippendorff, 2005; Rittel & Webber, 1973). In this sense, "designerly ways of knowing and thinking" (the term is Cross') became significant ways to deal with intricate and "ill-structuring" (Cross, 1982, p. 224) problems known as wicked problems by developing multifold ideas to produce the most appropriate solution (Cross, 1982; Johansson-Sköldberg, Woodilla & Çetinkaya, 2013). Since, the object of design has evolved to include services, systems, business models, policy innovation, organisational structures, as well as traditional work of producing tangible artefacts (Archer, 1979; Buchanan, 1992; Cross, 1982; Cross, Naughton & Walker, 1981; Johansson-Sköldberg, Woodilla & Çetinkaya, 2013; Rittel & Webber, 1973).

Richard Buchanan (1992), in his paper "Wicked Problems in Design Thinking", has addressed that this expansion of design in its meanings and connections is an inevitable phenomenon because of the intrinsic nature of design as "an art of experimental thinking" (p. 8). In other words, despite the conventional understanding, the essence of designing is not the production of pragmatic results, but the **philosophies** that underlie its performances (Buchanan, 1992). Therefore, design and "designerly" ways of thinking can be implicated in flexible (various) forms with philosophies that *shape human experiences and the world that we are living in* (Buchanan, 1992; Krippendorff, 2005; Willis, 2006). Building on this perspective, design scholars such as Terry Winograd, Fernando Flores, Charles Spinosa, Hubert Dreyfus, Anne-Marie Willis and Tony Fry have also conceptualised design in the context of ontology. Ontology, following Heidegger, is one's various ways of understanding about self (being) and its relations with the world around it (Fry, 2017; Willis, 2006). Therefore, **ontological design** is referring to "a way of understanding the dynamic **designing relations** between the world, things and human beings" (Fry, 2017, p. 26). The designing relation, according to Tony Fry (2017), is illustrated as follows:

> *Design almost totally directs the form and content of the environment in which we live. It pervades our lives, constitutes a world within the world, and impacts how we view, understand, use and extend this world (p. 26).*

For ontological design, design formulates the 'world' that we are living in and what we have designed is designing 'us' back (Escobar, 2018). These relations of designing exist and work without any direction (Fry, 2017). Rather, they are chaotically repeated within "*a hermeneutic circle*" (Willis, 2006, p. 70), which is to say

what is designed is designing the world and the "being-in-the-world" (Fry, 2017, p. 10) in a "redirective" (Fry, 2017, p. 30) way. This essential, but recently constructed conceptualisation of design is still developing in this sense.

An ontological understanding of design surfaces the political in design. Design materialises social relations and politics that have long-term structuring effects on society. Tony Fry (2017) has stated that "design always has profound political consequence" (p. 29), as it shapes the environments that people "depend" (p. 29) on and accordingly *shapes the lifestyles and minds of people* who live within those environments. Politics in ontological design is revealed through the fundamental notion that **design has "futural" consequences** (Fry, 2017; Willis, 2006). For this, Willis (2006) has defined that ontological design entails "an argument for particular ways of going about design activity" (p. 70), which acknowledges the responsibility of designing for its *discursive impact* on people and world both in the present and the future. In this way, design and the act of designing become politics.

Among various ontological consequences of designing, coloniality is one which limits sustainable futures. Tony Fry (2017) has commented on this as follows:

> The world of the South (or "underdeveloped countries") has in large part been an ontological designing consequence of the Eurocentric world of the North (or "developed countries"). Thus, design was deeply embedded in the structures of colonial imposition. For example, (…) the colonial city was not merely an expressive form of colonial power, but equally an ontologically designing operational system of order (p. 26).

After the territorial conquest of the European empire that colonised the subjugated distance by force, the history of coloniality have been constantly reproduced through the various forms of "military intervention, aid, humanitarian causes, technical assistance, goodwill or education" (Fry, 2017, p. 11). This phenomenon is called 'neocolonialism' by scholars in social science (Clarke & Haraway, 2018; Fry, 2017; Sachs, 2010). According to Fry (2017), the colonial discourses in contemporary society have been imposed through the activities, narrative and the spirit of "development".

Developmentalism and coloniality

Development has been used as an important term in global politics from the twentieth century (Cowen & Shenton, 1996; Dirlik, 2012; Du Pisani, 2006; Sachs, 2010; Sachs, 2017). The literal meanings of development are manifold, however, the "ideology of development" (Dirlik, 2012, p. 4) or development thinking which has acted as a powerful mentality to guide global thought and behaviour (Sachs, 2010) was designed within a specific context to indicate a specific circumstance (Du Pisani, 2006; Esteva, 1992; Ndlovu-Gatsheni, 2013; Sachs, 2010). The most consensual explanation of the invention of development thinking comes from an international assistance programme of the United States whose aim was to benefit the world through economic growth. In this sense, development began to stand for an economic richness of a nation, especially driven from the "Western style" of industrialisation. This understanding of development is called **development discourse**, or **developmentalism**. By the force of American hegemony, developmentalism has been shared worldwide and has urged the world to achieve the state of being "developed" (Sachs, 2010). The inverted paradigm of development was presented by the United States to monopolise its political leverage to the world after the Second World War and the model of development has been mostly borrowed from the industrial experiences of the United States and its neighbouring capitalist countries in the "West" (Clarke & Haraway, 2018; Du Pisani, 2006). Therefore, the 'West centred development' or 'Western style of development' became a dominant discourse in the sense of development thinking. Today, the practices of developmentalism survive through the work of international institutions such as the United Nations (UN), missionary ministries, and non-governmental organisations (NGOs) (Sachs, 2017).

However, developmentalism is often criticised as "a commitment to progress without people" (Dirlik, 2012, p. 4). A cast for development and for an achievement of a global position of superiority are accompanied by exacerbating anxiety to escape from the indignity of "underdeveloped-ness", which threatens society with uncertainties for the future (Dirlik, 2012). Many critics have condemned developmentalism for its madness of "using borrowed and foreign views" (Sachs, 2010, p. 3) rather than looking within one's own culture; a poor design of top-down strategies that fails to sustain the goodness for all; and a marginalisation of more than a half of the world (Sachs, 2010). As a consequence, the term 'development' became completely opposite from what it should have meant: people use the term in dreaming of a comprehensive future, but the real

consequence of "development" is exclusive and uncaring (Cowen & Shenton, 1996; Fry, 2017; Sachs, 2010). The development discourse and its consequences are inherently engendering **neocolonialism**. According to Sachs (2010), as developmentalism has become widespread throughout the world, with the emergence of globalisation, it has constructed a transnational economic class instead of national economic structure and this has produced an international economic hierarchy. Under this phenomenon, brutal competition between nations to obtain the winning title of "developed" has proliferated (Sachs, 2010; Sachs, 2017) and nations have come "under the custody of the economy" (Sachs, 2017, p. 2574; Clarke & Haraway, 2018).

In response to such criticisms, 'sustainable development' has been discussed as a new mainstream alternative for an inclusive future (Dirlik, 2012; Du Pisani, 2006; Sachs, 2010; Sachs, 2017). The concept of sustainable development has increasingly emerged since the 1970s with an acknowledgement of the ecological crisis and socio-political inequality caused by the extreme optimism of unlimited economic development (Du Pisani, 2006). In this sense, the concept has been promoted as a redevelopment for ecology and democracy (Sachs, 2010) and immersed into development discourse (Du Pisani, 2006; Sachs, 2017). However, sustainable development has faced criticism that it might be just another ideology of "Western" capitalist countries rooted from a shallow foundation imposed on the rest of the world that prolongs the disparity between "developed" and "underdeveloped" countries (Du Pisani, 2006). Indeed, Dirlik (2012) stated that

> Sustainable development has done little to change the existing paradigm of development, relying above all on technological solutions which may be part of the problem (p. 11).

Despite these concerns, in September 2015, the 2030 agenda for Sustainable Development (Sustainable Development Goals; SDGs) was adopted by the United Nations (UN) as a guide to world politics.

Methodology

Hermeneutic approach

This study is positioned within a standpoint of constructivism which is an ontology focusing on the meanings and the interpretations of an object produced by individuals (Creswell & Poth, 2017; Crotty, 1998). As this interpretivist approach "looks for culturally derived and historically situated interpretations of the social life-world" (Crotty, 1998, p. 67), the approach tries to explain the relative concept of understandings within the real-life context. From this ontological perspective, the research aimed to interrogate the discourses and meanings ascribed in the research object(s) from semiotic perspective and how design deploys them within the context of international power relations. Since the purpose of this research is to identify the hidden meanings beneath the narratives, the nature of the study is qualitative. To interpret the collected data, this study adopted a philosophical stance of **hermeneutics** and used **discourse analysis** for an in-depth analysis. Hermeneutics in social research is one of the streams of interpretivism whose premises is to understand social phenomenon through semiotic analysis of meanings, intentions and contextual relations (Johansson-Sköldberg, Woodilla & Çetinkaya, 2013). The analysis can be achieved by examining the language, literature, behaviour, art, religion, law, symbols, histories, and cultures surrounding the object(s) (Creswell & Poth, 2017; Crotty, 1998). As hermeneutics pursues the interpretation of meanings, this research approach is commensurate with the nature of discourse and ontological design.

Case study research

A case study research method of South Korea's development experience around the different types of development assistance strategies is used to investigate an in-depth understanding of the phenomenon within the real-life context (Yin, 2012). South Korea is a unique example of a country who once was a recipient of the "Western" development assistance became a producer of its own development assistance strategies to other "underdeveloped" countries. The research presents an empirical case of how a country who has been formerly influenced by West-centred developmentalism, transforming its political, economic and social foundations, replicates the performance of delivering development discourses elsewhere. This indicates how the ontological practices of designed development assistance strategies of the "West" shape South Korea's understanding (discourses) around development and how the global power relations influence new designs of the "underdeveloped" nation's (South Korea's) own development assistance strategies.

Table 1 List of documentary evidence used for analysis: Introductory resources

No.	Title	Publisher	Year published	Format	Page(s)	Abbreviation in this paper
1	Korea Saemaul Undong Center	Korea Saemaul Undong Center	2018	Website	14	I1
2	SMART Saemaul Undong story: comprehensive rural development	Korea International Cooperation Agency	2015	Electronic brochure	12	I2
3	Knowledge Sharing Program	Ministry of Strategy and Finance	2018	Electronic brochure	12	I3
4	Korea's leading think tank: KDI	Korea Development Institute	2018	Electronic brochure	36	I4
5	Happiness for All, with Global KOICA	Korea International Cooperation Agency	2016	Electronic brochure	16	I5

Table 2 List of documentary evidence used for analysis: Review documents

No.	Title	Publisher	Year published	Format	Page(s)	Abbreviation in this paper
6	Year One of Implementing the SDGs in the Republic of Korea: From a Model of Development Success to a Vision for Sustainable Development	The Government of Republic of Korea	2016	Report	34	R1
7	2017 Korea's ODA white paper: Beautiful sharing, wonderful growing	ODA Korea	2017	Report	185	R2

The data collected by documentary evidence and qualitative interview. Documentary evidence represents two types of materials including introductory resources and review documents of South Korea's Official Development Assistance (ODA). Introductory resource (I) indicates a self-introduction of an ODA agency in South Korea in the form of web pages, explanatory documents of organisation initiatives and brochures. This contains the history, purposes and visions of an organisation. This allows the researcher to determine the official explanations of the intention of the South Korea's development assistance and how South Korea identifies itself in this context. Based on the structure of South Korea's ODA, five introductory resources of the most active agencies of South Korea's development assistance were selected for analysis including the web pages (14-pages) as well as brochures (76-pages). Review document (R) is a summary and evaluation of the nation's aid plan. The summarised texts of the review provide a synthesis of all the plans and activities initiated by the South Korean government with specific examples and contain the evaluation of the nation's aid plan in the contexts of politics, economy, cultures and history. From this, this study aimed to gain a contextual understanding of the history of South Korea's ODA and the domestic and international influencers of the project. Two review documents published in 2016 and 2017 by the South Korean government were selected for an analysis. These documents are total 219 pages but selectively examined by the researchers based on the research objectives. The evidence was found in K-Developedia (www.kdevelopedia.org), a platform produced by the South Korean government to organise all information related to its development experience. Since the resources in K-Developedia are officially approved and presented by the South Korean government, this gives an authority and adequacy of the resources in this research to examine how the nation intends to design and deliver its own story. The list of the documentary evidences used for this research is indicated in Table 1 and Table 2.

In addition, qualitative data collected in this project was gathered through interviews. Two actors participated in the interviews, who were from the research department of the one of the key organisations communicating South Korea's development experience. The interviews lasted approximately thirty minutes with each participant and were conducted by video chat due to the far distance between the researchers and the participants. The interviews were semi-structured with some tentative questions. However, the questions were developed in indirect and value-neutral expressions to encourage the natural and spontaneous answers of the participants and minimise the unintended influence of the interviewer (Hammersley & Atkinson, 2010).

Discourse analysis

Since the case study object analysed in this research was a 'nation' which does not own a single unit as a whole nor has a projection to represent itself, it is impossible to meet the nation face-to-face and interview it. Therefore, to examine how a 'nation' identifies self and other, creates discourses, and promotes itself, this is achieved through analysing the narratives it produces. Therefore, the research used **discourse analysis** as a practical method to analyse the empirical case of South Korea, aims to investigate/define "colonial semiosis" (Mignolo, 2011, p. xx) ascribed in those narratives. With a critical approach that proposes a need for change and seeking alternatives, especially in the sense of power, justice and ethics, the research design of this study is aligned to Tony Fry's concept of ontological design to investigate how designed narratives can formulate the world and how possibilities for change might appear.

Table 3 Process of discourse analysis (Clarke, 1999, p. 364)

Action	Stages	Stages in this research
Story presentation	A. Hearing and Writing the Story	Reading documentary evidences
Identify significant statements	B. Hermeneutic interpretation	Identify initial insights
First level of themes	C. Learning through dialogue	Learning through interviews
Second level of themes	D. Construction	Construction
Individual categories		
Major group categories		
Group conceptual model	E. Conceptual model of phenomenon	Conceptual understanding

The analytic structure was informed by Clarke (1999)'s research design as shown in Table 3. First, the research data was collected by reading and re-reading the documentary evidences (stage A). Second, the research gained initial insights by identifying the significant statement from the data observed in stage A (stage B). The initial insights of stage B was conceptualised in depth through qualitative interviews (stage C). The findings of stage B and C were synthesised and discussed by constructing the meaning of the results (stage D). In the final stage, the holistic understanding of the research object was concluded (stage E). As discourse analysis derives interpretations and insights from observing and re-observing the materials, the analysis process of stage B, C, and D in this research were overlapped and replicated with several iterations at the necessity of the research.

Results and findings

Case study

We have developed the framework of the case based on the information we have found around developmentalism and the history of South Korea.

Background of the case: Colonial history of development

After the second World War, the territorial coloniality of the European empires that conquered the distant dominions finally came to an end. However, the traces of imperialism are transmitted to current people's lives formatted through laws, literacy, language, customs, and so forth (Said, 1994). This history is repeated with an imperial thinking, which is 'discourse'.

In the early twentieth century, the discourse of civilisation acted as a hegemonic discourse in the world (Kim, 2015). It distinguishes the world into "civil" and "barbarian" and gives the superiority to the European countries (so called the "West") by positing the cultures of the "West" as predominant (Kim, 2015). However, since the world had gone through a tragedy of the First World War, the fame and the power of "civilised West" had become quickly weakened (Brohman, 1995). The war seemed to reveal a violence of materiality and science driven by the "West" and suddenly the "West" had become a danger that threatened peace and humanity (Kim, 2015). Since the world had lost faith in the "civilised countries" in Europe, the power of civilisation discourse began to decline. In addition, as the United States raised its global supremacy, a need for a new hegemonic discourse headed by the United States grew (Kim, 2013).

To fulfil the need, developmentalism came out in the mid twentieth century alongside the emergence of American power (Kim, 2015; Sachs, 2010). The discourse was propagated during the presidential speech on 20 January 1949 of Harry S. Truman, the 33rd President of the United States (Ndlovu-Gatsheni, 2013; Sachs, 2010). In the speech, Truman declared the "Truman version of development" whose goal was to change the world by transforming each society with industrialisation and economic growth. Ndlovu-Gatsheni (2013) explained that this proposal was based on a "missionary task" of the West to enlighten the non-West who are "less-developed". From this conceptual framework, the world was divided into "developed" and "underdeveloped" depending on how much money a nation earns and how industrialised it is (Escobar, 1992; Esteva, 1992, Sachs, 2010). Because developmentalism understands the world through the standards of the "West", it prevents a comprehensive understanding of the global economy and society and oppresses sufficient discussions of different nations (Escobar, 2018; Kim, 2015; Sachs, 2010)

Developmentalism in South Korea

Developmentalism was widely accepted by the international society to overcome the economic crises that followed the Second World War. Especially the countries who had just achieved the political independence wanted to escape their poverty by following the principles of developmentalism (Kim, 2015). South Korea also adopted development discourse in this manner. As the Korean War broke out in 1950 right after the liberation from the imperial Japanese in 1945, the two Koreas had faced extreme poverty. Under the political influence of the United States, South Korea tried to overcome its economic crisis by following the American model of industrialisation and modernisation (Kim, 2015). In the 1960's, a former president Park Chung-hee (the fifth to the ninth president of the Republic of Korea from 1963 to 1979), stated that his regime's very first goal is to achieve economic development by industrialisation and to get a higher position in the global community (Kim, 2015). By adopting the concept of developmentalism, South Korea conceded to identifying itself as an "underdeveloped" country which is less progressed and less organised (Kim, 2013). Moreover, to stimulate the citizens' attention and increase the country's profitability, Park's government emphasised Korea's "undeveloped-ness" during his presidency (Kim, 2015). Regarding rural villages as a symbol of 'poverty' (Korea Saemaul Undong Center, 2018) and orthodox Confucianism as an old-fashioned tradition which is conservative and refutative for change, South Korea focused its national endeavours to transform from villages to government departments to become one of the "developed" countries while 'catching up with the West' (Sonn & Gimm, 2013; Kim, 2013). According to Kim (2013), the government's 'self-degradation' strategy has brought a hierarchical understanding of the (economically) developed "West" to others and a loss of independent originality of Korean tradition. In this respect, the modernisation of 'catching-up with the West' was legitimised in Korean society, as stated by Kim (2013).

Through its national endeavours to become one of the "developed" countries, South Korea has experienced *rapid change* in terms of economy, politics, and culture (Doucette & Müller, 2016). In 1996, South Korea joined as a member of the Development Assistance of the Organisation for Economic Co-operation and Development (OECD) and has reached over USD 30,000 for Gross Domestic Product (GDP) index in 2018. The country transformed its role in the international society from an aid-recipient to a donor (Doucette & Müller, 2016). South Korea calls this rapid transformation "development" and tries to *share its development strategies* as a part of the nation's foreign assistance plan to the other countries who want to become "developed" as South Korea has. "With the hope that South Korea's past can offer lessons for developing countries in search of sustainable and broad-based development" (KDI President Oh-Seok Hyun, in Han, 2012, p. 4), South Korea's project of sharing its development experience aims to contribute to poverty reduction in "underdeveloped" countries, to provide a new alternative option for policymakers, to increase the global marketisation of the nation, and to enhance the meta-narratives to facilitate the former (Doucette & Müller, 2016). By doing so, the nation strives to promote a positive image of its national identity while introducing its "development

experience" as "great advances in prosperity, stability, transparency, productivity, education, and in many other important areas" (Anholt, 2011, p. 294).

Development experience of South Korea and its relation to developmentalism

Here we introduce significant narratives related to developmentalism encompassed within South Korea's experiences of "development" as identified through the documentary data sources (as indicated in Table 1 and Table 2).

Table 4 Narratives related to South Korea's development experience

No.	Narratives related to the development experiences in 20th Century's South Korea (1950~2000)	Narratives related to the development experiences in 21th Century's South Korea (2000~)
1	The nation posited economic growth as the nation's top priority	The nation shows positive sense to developmentalist thinking
2	The nation carried out the Western model of modernisation and industrialisation to achieve economic growth	The nation emphasises its rapid transformation

First, *economic growth* was a top priority of the South Korean government before 2000s:

> As its iconic motto of "Let's Live Well" illustrates, it (Saemaul Undong, a government-led movement in 1960s-1970s' South Korea toward national development) was a movement aiming at better lives. It brought people around **the same dream of getting themselves out of poverty** and propelled **government's pursuit toward development**. (I2, P. 4)

Second, to achieve development, South Korea carried out *modernisation* and *industrialisation* agendas of the nation such as renovating traditional houses, paving roads and enlightening people:

> **The development of rural areas** is key to eradicating poverty. (I1)

> In 1970s, SMU (Saemaul Undong) served as a driving force behind **Korea's economic development by modernizing rural communities and reforming people's mentality**. (I2, p. 4)

> Priority projects (of SMU) at Foundation & Groundwork stage (year 1970~73): **Improve Living Environments** –expand roads inside villages, construct laundry facilities, improve roofs (eliminating the rural thatched houses). (I1)

> **Rural Enlightenment**: As part of SMU, rural enlightenment aiming at **changing people's mentality** was launched. To this end, **people were encouraged to abide by order and manner and keep their surroundings clean**. Along with it, SMU encouraged people to be frugal, receive education, read books and put their money in banks. (I2, p. 4)

> As a result, Korea not only successfully achieved economic growth in quantitative terms but also ultimately brought about **qualitative changes to its economy by receiving technology transfers and improving its systems of production and employment**. (R2, p. 30)

Some expressions indicate developmentalism was adopted in South Korean society.

By positing '*becoming an advanced country*' as an important goal, South Korea shows its positive sense of the developmentalist definition of "*advance*". In addition, the country distinguishes itself from others by identifying itself as *an "advanced country"* and its ODA partners as "*underdeveloped countries*":

> (After addressing that foreign aid had helped 'Korea's remarkable, seemingly almost miraculous development') As a country that has gone from being a receiver of ODA to being a giver of ODA, and **from being a least developed country to being an advanced country,** Korea's ODA history provides a unique example (R2, p. 24)

'*Recipient-turned-donor country*' is one of the most frequent and representative expressions to describe the rapid and unique transformation of South Korea. By using this expression, South Korea emphasises the uniqueness of its development experience and its status as an "*advanced*" country:

> The ROK (South Korea) has also transformed itself **from a recipient country of Official Development Assistance (ODA) into the 23rd largest Development Assistance Committee (DAC) donor** in terms of its ODA as a percentage of GNI, and the 16th largest donor by volume for many years. (R1, p. 2)

> On the strength of its remarkable economic development, Korea has successfully escaped poverty and hunger*, and has been returning what it once received from the international community. As **the only recipient-turned-donor country in the world**, Korea has become a formal member state of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), joining the ranks of advanced donor countries in the field of development cooperation. (R2, foreword)

Designing new development assistance strategies

The sharing of South Korea's development experience is one of the major development assistance strategies in South Korea's Official Development Assistance (ODA). To inform its development assistance strategy, the South Korean government formulates the nation's development story (development experience) in various ways.

Table 5 Narratives designing South Korea's development experience

No.	Narratives designing South Korea's development experience
1	The nation uses self-identification expressions (e.g., 'model', 'example', 'success', 'once a recipient and now a donor')
2	The nation uses expressions of praise (e.g., 'remarkable', 'miraculous')
3	The nation ratifies its development movements

The South Korean government designs its development story by using self-identification expressions and remarking on the experience.

'*Model*', '*example*' and '*success*' are frequently used to describe South Korea's development experience:

> Global Saemaul Undong: **Universal model for development cooperation**, which contributes to eradication of global poverty and sustainable development. (I1)

> As a country (South Korea) transformed from one of the poorest to **one of the most successful development examples in the world**, and as a donor country (…) (R1, p. 32)

As described in the previous findings, '*once a recipient and now a donor*' is the most common expression to emphasise South Korea's rapid and clear transformation.

Some *expressions of praise* were used by the ODA agencies of South Korea to describe its development experience:

> Behind this dramatic transformation (South Korea's economic growth) lay a long period of foreign aid receipt that made **Korea's remarkable, seemingly almost miraculous development** possible (R2, p. 24)

South Korea *gives authority* to its experiences of development by ratifying them. For instance, the nation designated Saemaul Undong (SMU) in UNESCO Memory of the World Register and established Saemaul Museum (development Museum)

Analysis and Discussion

Hermeneutic circle of designing development strategies in South Korea
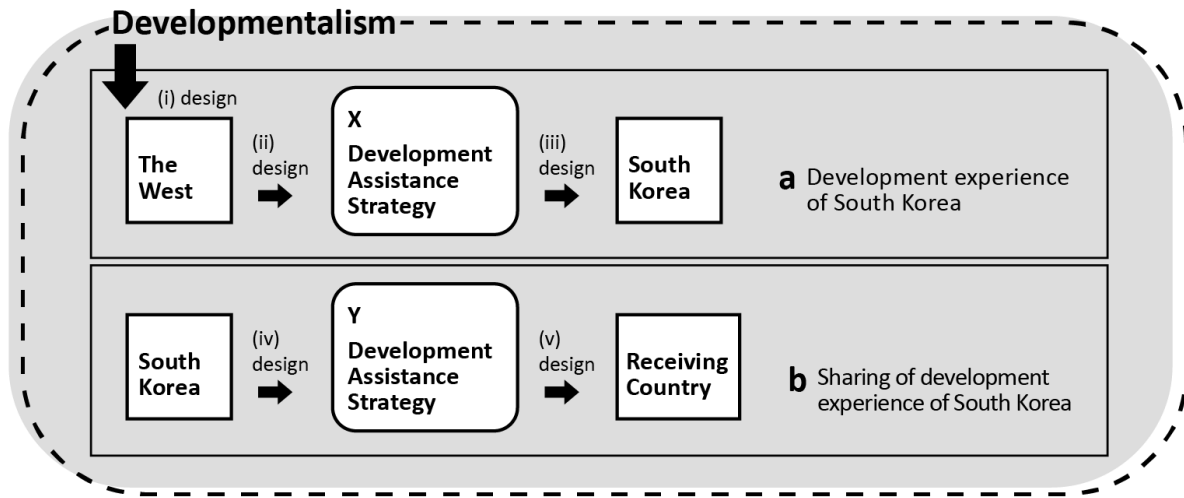
Figure 2: Ontological design model of South Korea's development strategy

In this part, we will discuss what we can understand from the case about ontological design and its political consequence encompassing coloniality of developmentalism. South Korea had experienced a rapid transformation in terms of economy and politics and tries to produce development assistance strategies based on this experience. However, we argue that South Korea's development experience contains colonial concept of West-centred developmentalism and this discourse shape the foundation of the nation's overall understanding of development and international power relations. Therefore, when South Korea designs development assistance strategy based on this understanding, the possible consequence of the project might be a reproduction of coloniality. Such phenomena have implications for design practitioners, as such governmental policies and programmes are implemented through products, services, projects and activities that design practitioners are increasingly involved in. Figure 2 represents the ontological relation of South Korea and its development strategies.

Development experience of South Korea

The research findings show how South Korea's development experience was influenced by West-centred developmentalism and how this in return designs the nation's understanding of development and global hierarchy. This is described in Figure 3.
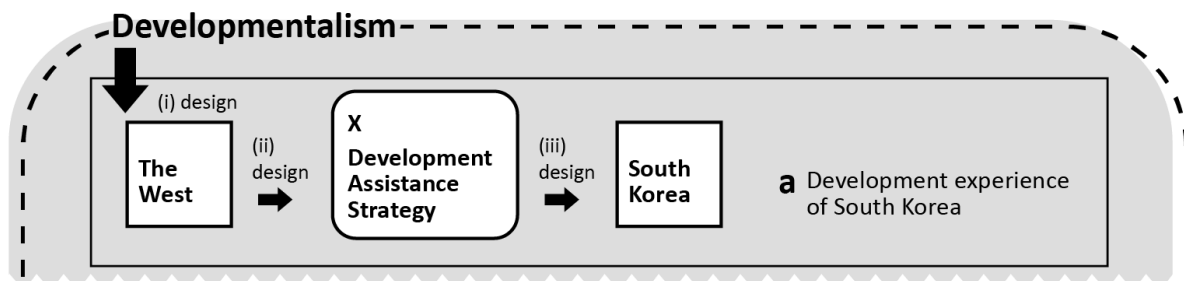
Figure 3: Ontological design model of development experience of South Korea

When developmentalism posits economic wealth as a substantial indicator to defining "develop-ness" (Esteva, 1992) this had appointed South Korea, who did not have an economic foundation after Korean War, as "underdeveloped". To escape from such stigma the South Korean government had economic growth as its top

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priority and led national development strategies including 1970s' Saemaul Undong (SMU). The nation's development strategies were mostly designed by imitating the "Western" model of modernisation and industrialisation. For instance, as seen in the results and findings part, by regarding rural houses as a symbol of poverty the country transformed traditional rural houses with slate roof and paved the roads. Also, the government had tried to follow the "advanced" industries of the "West" to provoke its economic growth. However, as mentioned in literature review, such notion that West-centred modernisation and industrialisation are an ideal mode of development is grounded by the discourses of development (Du Pisani, 2006; Escobar, 1992). Moreover, since the discourse of development was generated by American hegemony which divides the world into "developed" and "underdeveloped" by the standard of the "Western" model of economy (Kim, 2015; Ndlovu-Gatsheni, 2013; Sachs, 2010), the attempts of South Korea to become 'developed as the West' is a result of the acceptance of developmentalism.

Designing new development assistance strategy

The research findings also show how South Korea's developmentalist understanding is integrated in the nation's development assistance strategy and how this reproduces colonial concepts. This is described in Figure 4.
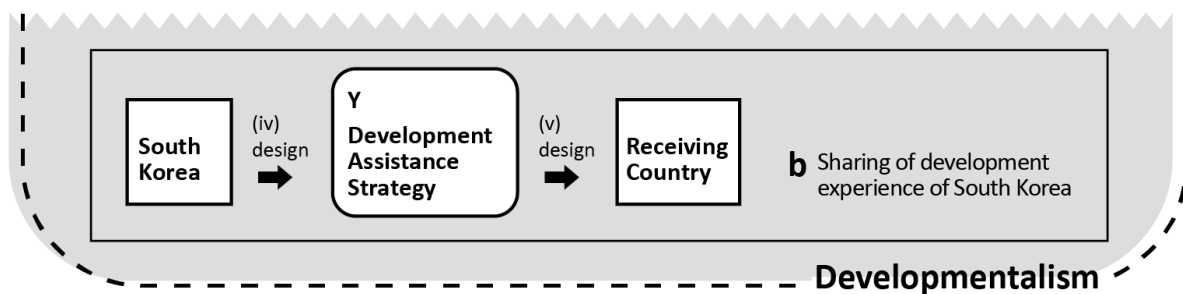
Figure 4: Ontological design model of sharing of development experience of South Korea

As shown in the results, the sharing of South Korea's development experience is one of the major development assistance strategies in South Korea. Thus, by analysing the narratives used in the South Korea's development story, we have found that the nation's development assistance strategies embody the West-centred developmentalism. South Korea has a positive sense on the word 'advance' and identifies itself as an 'advanced country' in designing its development story. The nation also employs the phrase, 'once a recipient and now a donor', to demonstrate its status as "advanced" and "developed" with an idea that being a donor indicates the nation's economic richness. However, as explained in the literature review, the phrases 'advanced country' and 'developed country' are the economy-centred definitions conceived of by the "Western" powers (Du Pisani, 2006; Escobar, 1992; Kim, 2013; Kim, 2015). That is to say that when South Korea deploys those phrases to emphasise its newly got position in the global economy, this indicates that the South Korean society has assented the spirit of developmentalism and so have its development assistance strategies. Developmentalism has reinforced the dominant power of the "West" to the non-West *by injecting dignity and superiority to the rich countries* in Northern America and Europe (Clarke & Haraway, 2018; Escobar, 1992; Kim, 2015). This reinforcement becomes even stronger when the rich "Western" countries have appointed the 'non-West' as an object of their "missionary task" (Kim, 2015, p. 102) for global development (Escobar, 1992; Kim, 2015). Likewise, when South Korea identifies itself as a "developed/advanced" country and its partners "underdeveloped" or an object of the country's assistance project ('mission'), South Korea's sharing of its development experience may replicate the same traces of the West-centred developmentalism that the country has been formerly influenced by: the economic stigmatisation on "underdeveloped-ness" reproduces the global power imbalances.

The results also show that South Korea's development story gives distinction and superiority to the 'able Korea'. Specifically, the country's self-identifying expressions describing its development experience such as 'model', 'example', 'success', and 'the only aid recipient-turned-donor country' reveal the nation's positive attention to its development experience. Since the words 'model' and 'example' themselves signify the meaning that the following object(s) is something to be learned from, those words imply a relational concept between the object and the others. Also, by using some praising words including 'remarkable' and 'miraculous'

to describe the nation's economic growth this positive attention is expanded. As those praising words emphasise the uniqueness and distinction of the following object, they make a classification and give specialty to the object. The development experience museum and UNESCO register of SMU also work in the same way. Likewise, since South Korea designs its development story in a positive image and separates its distinctiveness from other countries who are "underdeveloped", we argue that this can orchestrate hierarchies. From a broader perspective, within the context and the history of foreign aid being used as a strategic tool to consolidate the existing unequal global relationships (ODA Korea, 2017), the sharing of South Korea's development experience can also work as a means to provoke global power imbalances. Indeed, Escobar (1992) and Mudimbe (1988) emphasise that representation is the primary method to constitute the concept of dominance-subordination relation described in developmentalism.

Relation to ontological design
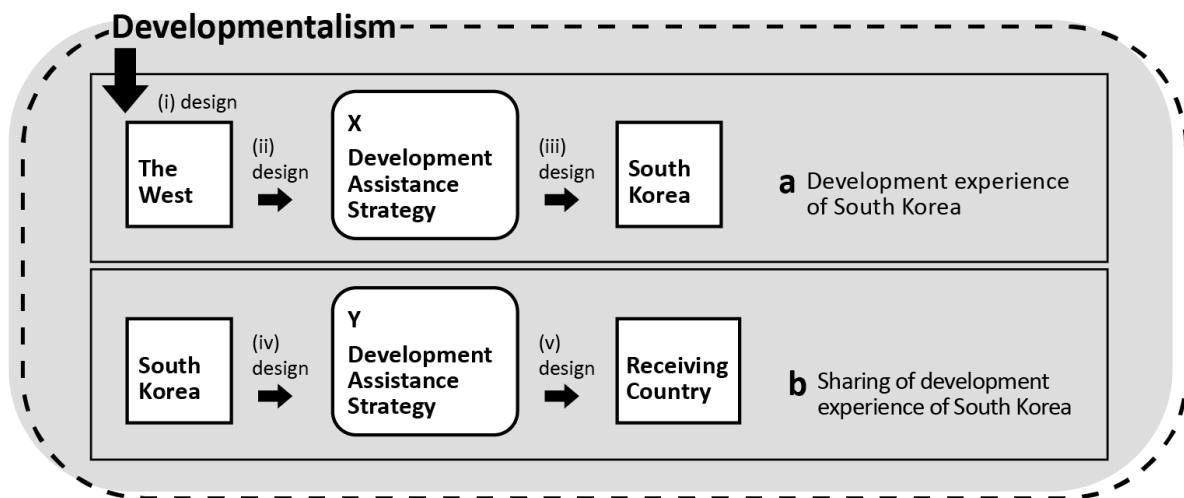
Figure 2: Ontological design model of South Korea's development strategy (revisited)

We have analysed how South Korea's development experience has been generated around different types of development assistance strategies. First, as explained in the literature review, the development assistance strategies designed by the "West", 'X' in Figure 2 (the figure is revisited from the previous discussion), was formed by the discourses of development (i&ii in Figure 2) (Du Pisani, 2006; Esteva, 1992; Ndlovu-Gatsheni, 2013; Sachs, 2010). The results of this research show that the designed development assistance strategies of the "West" (X) impacted the existing environments of the South Korean society. The strategies transformed the economic, political and social environment of the nation and reconstructed its social discourses by designing the nation's understanding around development and the global power relations (iii). Again, the results also show that these realigned discourses have brought a new designing (iv) of South Korea's own development assistance strategies for other "underdeveloped" countries (Y). This ontological circle of dynamic designing relations around development assistance strategies has worked in a "redirective way" (Fry, 2017, p. 30) over many years (Escobar, 2018; Fry, 2017; Wills, 2006). We haven't verified in this research, but the new development assistance strategies of South Korea might bring a similar consequences (v) of those of the West (iii).

In this study, we have inductively presented the significance of discourses for design theory and practice in the context of governmental policies and programmes related to developmentalism. Through this exploration of discourses of developmentalism based on the specific case of South Korea we illustrate the importance of studying the relational work of discourses with respect to design. Since, the object of design has evolved to include services, systems, business models, policy innovation, such phenomena have implications for design practitioners, as such governmental policies and programmes are implemented through products, services, projects and activities that design practitioners are increasingly involved in.

Conclusion

This research started from a question that 'how can ontological design theory relate to discourses of developmentalism?'. From an empirical case of South Korea's development experience, the research found that South Korea's experience of "development" encompasses West-centred developmentalism: the country posited economic growth for its top priority and imitated the "Western" model of modernisation and industrialisation to achieve this goal. We also found that South Korea's development assistance strategy targeting underdeveloped countries engenders developmentalism as well: when South Korea shares its "development" experience the country gives itself superiority to other countries by using self-phrasing and hierarchical expressions. Our findings reveal the ontological practices of design and their relation to discourse: the designed development assistance strategies of the "West" impacted experiences and thoughts of South Korean society and have brought a new designing of South Korea's own development assistance strategies. Development discourse has been transmitted throughout this process. From this, we conclude South Korea's development experience is "redirectively" (Fry, 2017, p. 30) interacting with the development thinking inside and outside the nation by implementing development assistance strategies of the "West" and designing the new strategies of the nation. This shows the ontological nature of design that interacts within the relations between designer, designed things, and the world around them and how these ontological relations of designing are closely woven through the work of discourses.

In this study, we have argued from the position that the relational work of discourses is important to consider for design theory and practice. In this sense, we suggest design practitioners need to ask ways to produce more comprehensive designs considering possible futures, such as decolonisation, and have responsibilities to introduce this approach to design practices including policy making and discussions of global development agendas. This work forms the basis of a PhD exploration into ontological design and discourses. Further work will elaborate on those early insights presented here.

Appendix: List of documentary evidence used for analysis

Introductory resource (I)

I1: Korea Saemaul Undong Center. (2018). Retrieved from http://www.saemaul.or.kr/eng/

I2: Korea International Cooperation Agency (2015). *SMART Saemaul Undong story: comprehensive rural development* [Brochure]. Retrieved from http://koica.go.kr/download/2015/brochure_Saemaul_Undong.pdf

I3: Ministry of Strategy and Finance (2018). *Knowledge Sharing Program* [brochure]. Retrieved from http://ksp.kdi.re.kr/skin/files/ksp/KSPBrochure_en_2017.pdf

I4: Korea Development Institute (2018). *Korea's leading think tank: KDI* [brochure]. Retrieved from http://www.kdi.re.kr/kdi_eng/about/data/kdi_brochure_2018_eng.pdf

I5: Korea International Cooperation Agency (2016). *Happiness for All, with Global KOICA* [brochure]. Retrieved from http://www.koica.go.kr/download/2016/KOICA_Brochure_2016.pdf

Review document (R)

R1: The Government of Republic of Korea. (2016). *Year One of Implementing the SDGs in the Republic of Korea: From a Model of Development Success to a Vision for Sustainable Development*. New York: Sustainable Development Knowledge Platform.

R2: ODA Korea (2017). *2017 Korea's ODA white paper: Beautiful sharing, wonderful growing*. Sejong: Committee for International Development Cooperation.

The evidence was found in K-Developedia (www.kdevelopedia.org) which is a platform produced by the South Korean government with a purpose to organise all information related to their development experience. The most important standard to define the appropriateness of the resource was whether the data contain the ideas of promoting a nation or the national narratives such as self-identification, storytelling of a nation or of organisational activities, especially encompassing the topic of *South Korea's development experience and its communication of the former*. The resource should be documented in forms of texts and pictures which the researchers can easily go back and analyse their meanings repeatedly.

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Design, power and colonisation: decolonial and anti-oppressive explorations on three approaches for Design for Sustainability

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Our contemporary world is organized in a modern/colonial structure. As people, professions and practices engage in cross-country Design for Sustainability (DfS), projects have the potential of sustaining or changing modern/colonial power structures. In such project relations, good intentions in working for sustainability do not directly result in liberation from modern/colonial power structures. In this paper we introduce three approaches in DfS that deal with power relations. Using a Freirean (1970) decolonial perspective, we analyse these approaches to see how they can inform DfS towards being decolonial and anti-oppressive. We conclude that steering DfS to become decolonial or colonizing is a relational issue based on the interplay between the designers' position in the modern/colonial structure, the design approach chosen, the place and the people involved in DfS. Hence, a continuous critical reflexive practice is needed in order to prevent DfS from becoming yet another colonial tool.

Keywords: Design for Sustainability, coloniality, decolonial, power structures, reflexivity

Introduction

Our contemporary world is organized in a colonial structure (Mignolo 2012). As Dei and Lordan (2016) point out, colonialism, more than just an historical moment, is a global structure in place since the historical moment. This structure has benefited European regions and worldviews and oppressed non-western societies and worldviews for the benefit of Europe (Mignolo 2012). Similarly, Walter Mignolo (2012), defining the current society as "modern/colonial", demonstrates how modern society emerged from and is sustained by European colonization and dominance. Even though many former colonies are now independent countries, the systems of dependence still exists, especially through coloniality (Grosfoguel, 2002). Coloniality is the imposition of global desires, of Euro-USA Eurocentric (Quinteros, 2015) worldviews and value system in a way that benefits Europe and the USA while at the same time affecting these regions (Quinteros, 2015; Grosfoguel 2002).

The professional and academic field Design, as well as the fields from which we borrow - and steal - information and methods in Design for Sustainability (DfS), such as Sustainability Science and Anthropology emerged from the modern/colonial world. As Haraway (2016) points out "nothing comes without its worlds". That is, design and sustainability are situated in Western modern/colonial paradigm and thus inherit the modern/colonial structure and behaviours. Even though there are growing efforts to "open up" various field for diverse worldviews, we have to be aware of their roots in the colonial power structure and how such

situatedness and inheritance play a role in sustaining or changing the modern/colonial structure when we, as designers and design researchers act in and through various locations. As many authors have argued (Ostrom 2009; Schumacher 1973; Lovelock, 1995; Grinspoon 2016), sustainability can only be achieved if we shift from oppressive hierarchical organizations to horizontal collaboration. Therefore, one of the needs for sustainability is the dismantling of oppressive hierarchical power relations such as the modern/colonial power structure.

In this paper we describe and analyse three approaches in Design for Sustainability: design activism, humble designing and radical listening. Using Paulo Freire's decolonial work on the ontologies of the oppressed as a lens (1970), we look at how each approach deals with power structures and what they mean in relation to colonization. It is important to notice, that, for this positionality that we do not claim to provide a global "solution" for decolonial and anti-oppressive DfS. The power relations and inheritances of colonized and colonizer people and places are as diverse as the cultures oppressed by colonization. Therefore, there is no single solution that can fit every place and situation. What we argue for is a constant critical reflection on positionality. The study we present here and the conclusions draw for decolonial and anti-oppressive DfS is thus situated in our experiences of being born in and working in Brazil, The Netherlands, Mozambique, Finland, Sápmi, Sweden, Borneo, Mexico, Namibia, The United Kingdom and South Africa. Hence, in this paper we look at how the positionality of people involved in the design process influences each approach towards being colonial or decolonial. Our aim is to elucidate how positionality of a designer or researcher is not fixed, but rather changes dialectically with the place and time and the design approach chosen. Our goal is to highlight the importance and encourage a constant critical reflective practice by designers in order to understand the possible colonizing results of each situation we find ourselves in.

Contextual Framework

Parts of the world have continuously benefited from the modern/colonial power structure in place at the cost of others (Mignolo, 2012). Colonizing countries have benefited not only from the extraction of values - natural resources, cheap labour and cheap land - from the (former)colonies (former in parenthesis as bondage still remains in both economic but also ontological sense as shown by Mignolo, 2012) but also from using colonial power structures to become the "good doers". That is, from a higher position in power structures, western (mostly EU-USA) people have had the opportunity to access oppressed/(former)colonial countries and carry projects to - among a plethora of colonizing words - "save", "improve", "empower" and "dignify" the "underdeveloped world". Such efforts pose western perspectives as both oppressors in colonial histories but also as contemporary "saviours". This relation, far from being liberating, sustains the structure of dependence and bondage between colonizers and (former)colonial areas (Freire, 1970). It is important to notice, however, that many projects have actually engaged critically with colonial and local power relations in the search for emancipation and liberation, but they are a small amount in comparison to the plethora of cross-country collaborations that end up sustaining rather breaking modern/colonial structures. For DfS projects to be decolonial it is not only a matter of good intention, but rather a matter of the contextual interplay of *what*, *how* and *where* a project is done as well as *who* is doing it and *with/for whom* the project is being done.

In a globalized - colonized - world, it is inevitable that people, ideas, methods and practices travel around. This is the case with Industrial Design, Sustainability Science and all other academic fields. Born in Europe from the Industrial Revolution, Industrial Design schools are now widespread around the globe, echoing and sustaining the canons of German, English, Italian and Scandinavian design traditions. Not dismissing the achievements and relevance of European design movements, it is important to notice that, as Barad (1996) argues, knowledges are not innocent. Industrial Design emerged from a specific nature/culture and political situation; it is therefore a situated field that echoes the worldview of where it was created. The movement of ideas and practices to areas other than were it emerged is not harmful *per se*; however, it is important to be aware of how such displacements - of people, fields, methods and ideas - work through and affect colonial power structures of dependency. As design starts to engage more and more across political borders, it is important to see how design approaches can be colonizing by imposing worldviews and prescribing solutions and methods.

Design (research) work becoming neo-colonialism is not only a matter of the non-innocence and situatedness of the field of Design and its approaches. It is an interplay between the situated field, the situated design team (individual or group with their cultures and inheritances) and the situated place and community that design work will affect and their positions in the modern/colonial structure. This dynamic becomes even more problematic when we deal with Design for Sustainability.

As Manzini and Vezzoli (2002) argue, sustainability is deeply local and tied to specific nature/culture contexts. Nevertheless, as Grinspoon (2016) reveals, sustainability is broadly defined as collective action for sustaining life on (of and as) the planet. Sustainability therefore has two sides in dialectic relation: being simultaneously local and global. The relation between this two-sided perspective can be seen clearly in the concept of Gaia (Lovelock, 1995; Latour, 2017). Gaia presents the world as one living organism made by various interrelated systems. Gaia shows how we, Homo Sapiens are, while living in diverse cultures, also interconnected to and part of bigger ecological systems. However, as Bruno Latour (2017) points out in his book "Facing Gaia", Gaia is an interconnection of communities in conflict rather than of peacefully connected entities. In light of a world formed by conflicting communities with different positions of power and privilege, Sustainability cannot be taken as an innocent agenda. Sustainability, with its specific type of knowledge (such as the emerging field of Sustainability Science) is also a situated field. Emerging from a Western academic environment, just as Design, it carries western worldviews and value systems. Imposing sustainability as a neutral global agenda thus renders as a form of coloniality.

In Design for Sustainability we adopt many concepts from Sustainability Science and its way of seeing the world to guide design work. One example, amongst various, is the adoption of the term "Anthropocene". This controversial, yet vastly adopted term, was chosen to define our current geological epoch. The Anthropocene, the epoch of the human, refers to the impact of humans on the planet being greater than the impact of all natural factors combined (Grinspoon, 2016). Through its terminology the Anthropocene suggests that to be human is to be in unbalance with Earth's natural systems - it is to make harmful impact on the planet. Framing our epoch in this way assumes that unsustainability is a natural and inevitable consequence of *a "normal" way* of being homo sapiens. That is, the Anthropocene generalizes and flattens humanity by implying that there is a normal way of being human. As any generalized view of the world inevitably assumes the image of the powerful, and as sustainability is a western concept, the Anthropocene homogenizes humanity through a Euro-USA-centric white hetero-patriarchal image.

Arguing against the homogenizing nature of the term Anthropocene, authors such as Donna Haraway (2016) have suggested other terms to name our epoch. For instance, Haraway (2016) has suggested terms such as Capitalocene or Chutchlucene. Haraway proposes such nomenclature as to highlight that unsustainability is not a natural consequence of the Homo sapiens' specie, but rather a consequence of a specific way of organizing society, a consequence of a capitalist modern/colonial socio-political structure.

If Design is a Western- situated field, Design for Sustainability has both feet in the Western world. Here the potential for Design to become colonialist is even stronger. In working in Design for Sustainability, we have the afore mentioned interplay of situated perspectives (profession, people and communities), plus the situated field of sustainability, the imposition sustainability as a global agenda through global political movements and the two-sided perspective of local and global implications of sustainability.

Methodology

In order to analyse how Design for Sustainability can be colonizing or liberating through this interplay, we use here the work of Brazilian educator and philosopher Paulo Freire as lens. Freire's work is intrinsically decolonial (Chabalgoity, 2017) as it fights for the liberation (a word he uses to imply action for freedom) of the colonized self from the oppressive structures of the modern/colonial world (Chabalgoity, 2017). We use Freire's work for two main reasons: First, because his philosophical and theoretical articulations are deeply connected with action. As Freire points out, theory and practice are not dichotomies, but are in a dialectical relation to each other. As he argues, knowledge is not transferred but rather created by acting to change the world one lives in. This link towards action, we believe, is very fitting with design. Secondly, we use his work because his relevance as an author and teacher has served as inspiration for much of the latter work on decolonization, anti-oppressive work and on non-western (in this case Latin-American) ontologies.

As Chabalgoity (2017) shows, the Freirean oppressed is different to the European "subaltern". The European subaltern is the one from whom ownership was denied, while Freire's oppressed is the one that, through colonization, has been denied the possibility of being "fully human". The oppressed in Freire's notion, is the one into whom was internalized a feeling and behaviour of being "naturally less and worse" than the (colonizer) oppressor (Freire, 1970; Chanalgoity, 2017). It is important to notice, however, that the oppressor and the oppressed in Freire's work are not separate people, but rather behaviours. In his book "Pedagogy of the oppressed" (1970) Freire defines oppression as a behaviour of prescription. According to Freire, the relationship of oppression is the prescription of the oppressor's worldview and values onto the oppressed,

forcing the latter to not have the right to its own worldview and values (Freire, 1970). One central concept in Freire's work is that liberation from oppression starts from "concientização". Concientização (becoming conscious, from Portuguese) stands for a becoming aware that is inseparable from action - a getting to know about one's position and action in the world by acting (Freire 1970). Freire (1996) argues "it would be incomprehensible if the understanding of my presence in the world didn't already mean the impossibility of my absence in the construction the presence itself. As a conscious presence in the world, I cannot escape the ethical responsibility of the moving myself in the world" (1996, p 19 – authors' translation). For Freire, concientização – the active becoming aware - and consequently liberation – becoming free from oppressive structures - can only happen through praxis of interconnected critical reflection and action (Freire, 1970).

In order to analyse Design for Sustainability from a Freirean perspective, we will focus on analysing three aspects of each DfS approach that we introduce below: (1) the relationship between people and the possible behaviours of prescription, (2) the position of people in the power structure of the modern/colonial world and (3) the possibilities for liberation or bondage in each based on whether spaces for concientização (becoming aware about and through action) are opened or not.

In the next session we describe three different approaches to Design for Sustainability that focus on power relations. These approaches are not exemplary, but rather examples - three items in a broad and diverse spectrum. We chose these three snapshots of design action for two main reasons: First, because we believe they reveal three very different ways of dealing with power in design. Having these three diverse and rather opposing ways of doing design for sustainability can serve as points of navigation for a broader conversation about power issues in design. Secondly, we chose the approaches for our intimacy and experience in using and researching them in different nature/culture and political situations around the globe.

Study: Three approaches for Design for Sustainability

In this section, we describe three different approaches for dealing with power issues in Design for Sustainability: Design activism, humble designing and radical listening. We first introduce each approach and give brief examples of each. We then look at the similarities between each and lastly, we analyse them from a decolonial and anti-oppressive perspective using the lens described above. The goal of this analysis is to elucidate the possibilities and dangers that each approach provides in informing non-oppressive and decolonial ways of doing Design for Sustainability.

As mentioned before, these are not isolated approaches, but rather images of the field of Design for Sustainability in a motion of understanding and tackling power issues in design for sustainability. As parts of a similar spectrum, these three approaches share various characteristics, such as: they are all centred in collaboration; they are aware of power relations between designer, community and political governance; they are sensitive to the imposition of worldviews and values; and are all based on mutual learning. However, it is the degree to which each approach takes these characteristics that sets them apart and makes them fitting to specific natural/cultural and political situation. We hope that revealing how each approach articulates these characteristics can contribute to nuancing power issues in design and help designers and design researchers to critically reflect on the situations we find ourselves in in order find non-oppressive ways of doing Design for Sustainability. Through this, we hope to help steering Design for Sustainability away from becoming a neo-colonial tool for the continuous domination of the world by a Western-modern/colonial capitalist agenda of sustainable development.

Design activism

Design activism, as defined by Fuad Luke (2009, p.27) is "design thinking, imagination and practice applied knowingly or unknowingly to create a counter-narrative aimed at generating and balancing positive social, institutional, environmental and/or economic change". Design activism comes into being when a group of people (of which designers may or not be part of), discontent with the actions of mainstream political governance, take the initiative (co-articulated counter-narrative) to act on the issue themselves. (Fuad-Luke, 2009; Julier, 2013)

Design activism is when people who are not on the top of a power structure, empower themselves by coming together, forming a collective, co-articulating an issue to be addressed, and tackle the issue as an independent collective that takes front and defies governing powers (Julier, 2013). Design activism is an action of taking over power through action. Design activism is thus community driven and community led, it is an insider action

within a community that identifies itself through a common issue. It is a motion from and by insiders to take over power and collectively act for creating change.

Kääntöpöytä Urban Farming - Helsinki, Finland.

One example of Design activism is the growing urban farming movement, in which the first author has been involved. While not all urban farming is necessarily design activism (as they may rely on governmental support in order to start) many of the urban farming, specially the guerrilla farming movements (see for example Reynolds, 2008) are examples of people taking over power to farm in urban areas. One example in this movement that started as a design activism action was the Kääntöpöytä (turntable in Finnish) area in Helsinki, Finland. Kääntöpöytä started with a group of people taking over an abandoned dumpster in an unused train maintenance area. The group started by turning the dumpster into an urban farming space. Nowadays, Kääntöpöytä has a bigger area comprising a greenhouse, a kitchen and an event space in the same area (Torretta, 2014). Kääntöpöytä, at present, defines itself as "a sustainable food production and urban planning laboratory located in Pasila's yard, and a centre for peer learning and urban culture"(Kääntopöytä, n.d.).

However, while design activism, for its interventionist approach, challenges mainstream politics (Julier, 2013) takes over and defies power structures, it does not necessarily survive as activist. For example, the Kääntöpöytä group, having started with a design activist approach, developed towards having governmental, industrial and non-governmental organizations support in upscaling urban farming practices throughout the city of Helsinki, becoming more of an urban design project (Torretta, 2014). As Julier (2013) argues Design activism "moves within the challenges of pre-existing circumstances, while also attempting to reorientate these. In this way, design activism also operates amongst its others. It exploits certain conditions of neoliberalism, to recycle and reprogram them" (Julier, 2013 p. 226). However, these changing relations between the design activist group and the ruling power, as can be seen with the Kääntöpöutä organization (Torretta, 2014) are not smooth and fixed, they are a constant negotiation and fight for power and space to sustain their action.

In summary, design activism is about taking power to make an envisioned change through collaboration. This change, is co-articulated (Julier, 2013) by a community that gathers around an issue and then lives in constant negotiation with the ruling powers. Design activism is dialectic action to take over power.

Humble designing

Humble designing (de Jong *et al.*, 2016; Reitsma *et al.*, 2017) is an approach that emerged out of a discomfort with Design for Sustainability (DfS). Humble designing is an approach to counter DfS becoming increasingly prescriptive, especially due to the widespread approach in DfS of nudging behaviour change. Uncomfortable with the otherness implicit in DfS - of designers demanding others to change – Humble designing is asking "who are we to design for others?" and "who are we to tell others what to do?" (Reitsma *et al.,* 2017). This design approach for sustainability seeks the acknowledgement of diverse worldviews and states that people are always in a coming together of partial perspectives, where one cannot have a full understanding of the complete situation. Humble design is a call for designers and design researchers to learn from others and to learn to be guided by the people we engage with in design processes (Reitsma *et al.,* 2017). The goal is to design in a way that is beneficial for all involved and that, instead of colonizing, opens space for horizontal collaboration (Reitsma *et al.,* 2017).

Due to this characteristics, humble designing can come into being when designers engage with a community that they are not part of. In this case, the designer may have a stronger power as an outsider, which then demands humbleness to engage in a way to level the power balance. The aim of humble designing is for designers to seek the creation of a dialogical space, balanced in power hierarchies that facilitates the opening of design processes to the perspectives of others. Humble designing is specifically focused on respecting diversity, as it is about creating a space for mutual learning and exchange between diverse worldviews, where a new way of being together can emerge that challenges pre-existing power positions.

On/off or in Between. Kungsbacka, Sweden

One example in which a humble designing approach has been adopted is the *On/off or in between* project, in which the second author has been involved. This project focused on a micro grid area connecting different apartment buildings and public sector organisations. The electricity is produced and shared within this local system. Initially, the aim of the project was to make the apartment building dwellers shift their electricity use

in order to make the energy use in the local system more efficient. The first envisioned solution by the design team was to stimulate people in the apartment buildings to do their laundry during day-time when the energy is produced by solar panels. However, the designers considered it unfair to ask for such a shift from people. Firstly, because it is difficult for people to change their routines, especially if they do not have a personal motivation for doing so; and secondly, because they are part of a system, connected through the grid. Therefore, it would make more sense to focus on a systemic perspective rather than on individuals. From realizing the potentially oppressive nature of the design process, the design team decided to shift towards a more participatory approach in order to involve the different actors in the grid and to accommodate and understand the different relations that each had to the system. The designers came up with a game to ask all actors to contribute with their perspective and ideas for optimising the system. By becoming aware of the power difference, and potential prescriptive nature of the initial process, the designers decided to manage and balance the power relation. The shift resulted in an attempt of humble designing and through that of opening up for mutual learning. This way, the stance that was taken by the designers was humbler than the initial entry point.

It is important to notice that humble designing is not only about creating participation (as design activism also is), but it is about managing power and humbleness between all participating actors in order to create a way of being and working together that is special and specific for that group of people (Reitsma *et al.,* 2017). Humble designing is about managing power relations in design (de Jong *et al*., 2016; Reitsma *et al.*, 2017).

Radical Listening

Radical listening is a design approach that has listening as its core. Radical listening emerged from the field of pedagogy and was first articulated by Kincheloe (2008 cited in Moore, 2018) based on Paulo Feire's (1970) idea of Radical Love. Radical listening is about having listening as the roots of the process. Moore (2018) explains that radical listening is when one is open "to understand another person's point of view without seeking to change them" while also being open to change through this listening (Moore, 2018 p. 481).

Radical Listening in Design for Sustainability can come into being when a person in a position of power engages with a person/community in a less powerful position with the willingness of contributing to the community. This approach, aware of cultural sensitivity issues, trusts "community members to be the best solvers of their problems. It means asking for individuals' ideas and implementing their solutions" (Health in Harmony, n.d.). Perceiving the big power gap, as outsider (designer) who has the power to bring about action – by political or financial privileges – lets the community (people who want change and will be affected by it) guide the process and is open to change the design way of working according to what the community wants. The design outsider assumes a position sharing the privilege and using it as a way to bring about the demanded change.

Preserving tropical forests through health care - Borneo

An example of Radical listening is *Health in Harmony* organization's (see www.healthinharmony.org) work with communities in Borneo for preserving rain forests. The communities they worked with logged the forests, which besides causing harmful impact to the forest, was also harmful for the local fish stock, fauna and weather. For these communities, logging was their main source of income for the communities. However, these communities voiced the willingness to stop the logging. Based on this willingness, the Health and Harmony organization decided to take action to help locals in stopping it. From a privileged position as a Western organization, Health in Harmony's founder Kinnari Webb engaged in 400 hours of listening to local communities by asking what they wanted in order to stop logging. After the 400 hours, the common answer was high quality and accessible health care. Since the organization was a specialist in healthcare, they organized a local health care system with all functional details defined and decided by the locals. Health and Harmony had to change, through the process, their perspective of what they believed creating a healthcare system and forest monitoring system should be like. The organization was open, though radical listening, to change their own views. The project has been successful in spite of various conflicts with local governments and organizations that previously benefited from the logging. The benefits to the community are notorious and far from what the locals could expect from the local government (Health in Harmony, n.d.).

Radical listening is also about collaboration, but in a way that also opens up the design process to be led and changed by the community. In this case it is a collaboration across power structures for doing something that benefits the least powerful and not necessarily the ones in positions of power. The process of radical listening

runs on local knowledge and acknowledges the community as the biggest specialist in the issue they want to tackle (Health in Harmony, n.d.). Radical listening is about sharing power and privilege through listening.

Results & Analysis

Similarities and nuances

As can be seen above, all three approaches share various characteristics, but their differences are positioned in the degree and format to which each characteristic takes shape within each of the approaches. One common characteristic is that they are all based on collaboration, as they all acknowledge that no individual can decide and design for a whole community. However, the types of collaboration vary greatly: design activism is a bottom-up co-articulated action that starts from a community created around an issue (Fuad-luke, 2009; Julier, 2013; Torretta, 2014). In this sense, it is collaboration between insiders in order to act and take – through that action – power to change their reality. On the other hand, humble designing is a collaboration between different communities with different power positions. Humble designing is therefore a collaboration through engagement of different communities in order to – through realizing and managing power relations – achieve a unique way of being and working together (Reitsma *et al.,* 2017). Furthermore, while radical listening is also about engagement between different groups, it is between groups with a notorious power gap. It happens when there is a group asking for change, but powerless and the other group as powerful and willing to share the power to assist the other group in achieving their own goals. Radical listening is a collaboration by sharing power. The type of collaboration is intrinsically linked to the way each approach deals with power relations. Thus, another commonality is the awareness of power relations needed in all three approaches. These approaches are aware of the socio-political power structures embedded in the situations they are in. Nevertheless, it is how each approach deals with power relations that sets them apart. Design activism takes over power, humble design seeks to level and manage power while radical listening focuses on sharing power. It is this situational socio-political awareness that is very important in seeing the possibilities and dangers of each from a decolonial and anti-oppressive perspective. In the following section, we analyse and compare these approaches using the decolonial lens introduced before.

Applying a Freirean decolonial lens

Here we use the three items from the before mentioned decolonial lens to analyse dialectically the three approaches: (1) the relationship between people and the possible behaviours of prescription, (2) the position of people in the power structure of the modern/colonial world and (3) the possibilities for liberation or bondage in each based on whether spaces for concientização is opened or not. As these items are related in a way in which one can influence the other, and due to the shared commonalities between the three approaches for DfS described above, we do this analysis dialectically by focusing on each approach but simultaneously comparing and contrasting the different approaches which each decolonial lens' item.

Design activism

The first aspect, and most prominent in Freire's definition of oppression, is the behaviour of prescription. In this case, a process that has the possibility of being prescriptive assumes colonialist oppressive behaviour (Freire, 1970 p. 29). While all three approaches try to get away from prescriptiveness, especially humble designing and radical listening, the position of the designer in relation to the group affected can shift these approaches towards being colonizing. Especially in design activism, since it is a bottom up action by a community gathered through an issue, oppression can come depending on whether designers are outsiders or insiders. As outsiders, designers cannot start a design activism for sustainability process in a place where they are not part of the community or where there is no community gathered around a specific issue. Starting a process in a place they are not part of, designers would be forcing people around an issue chosen, and thus imposed, by the design team. As design activism is led by a community that comes together around and co-articulates an issue (Julier, 2013), designers have to be part of this coming together of the community. This aspect is problematic when we look at the second item of the decolonial lens: the position of people in the modern/colonial work. That is, a strong colonial behaviour can arise through design activism if people from colonizing countries, through structures of privilege get to carry projects in (former)colonial countries and chose design activism as the design approach. In this case, a more decolonial approach would be to support and facilitate existing design activist endeavours or open up for the possibility of it through processes of co-articulation of issues through, for example, humble designing and radical listening as we will see later.

When it comes to the third aspect, design activism is an act of liberation as it is about directly taking over power. Design activism has to start from concientização, from an understanding of one's position in the world through action and thus becoming aware of being in a lower power position and acting to take over power. However, the internal dynamic of a design activism group, in order to encourage liberation has to hold space for the praxis of critical reflection and action – it has to support the collective concientização through its action so that the issue to be acted upon is indeed co-articulated. Otherwise, internal dependencies between the actors of the group can be created, thus, forming an internal power structure that does not allow collective liberation.

Humble designing

As seen above, humble designing was created to counter the increasingly prescriptive behaviour of Design for Sustainability. However, we cannot take humble designing as innocent and naturally anti-oppressive and decolonial approach. Humble designing is an approach to be chosen by a design group with power to control a design process that involves more actors. The choice of humble designing can also be an imposition. Aimed at levelling power structures within a project team, humble designing can leave the greater modern/colonial global structure intact. A process that levels internal power relations but does not address greater modern/colonial structures, while it is not a colonizing approach, cannot be defined as decolonial as it does not contribute to changing the modern/colonial power structure. The strength of humble designing as a decolonial approach is when it happens with people from different positions in the modern/colonial structure. That is, humble design is fitting in situations in which the modern/colonial structure intrinsically puts the design team in a powerful position over the other project actors - such as western designers working in (former)colonial countries. In this case, managing the power structure by letting go of privilege and opening up for the creation of the dialogic space that is central to this approach, can allow processes of concientização. In this case, concientização can only happen if the dialogic space allows the praxis of critical reflection and action (Freire, 1970) throughout design process. That is, the design process has to be centred on a reflection and action of each person's positionality. Designers should not be in power to manage power relations, but rather, through the dialogic space allow the power management to be shared by all actors. This, in turn, relates to the third aspect of the decolonial lens. If designers choose humble design, but stay in power to manage power relations, there will still be a dependency on the designers. Hence, liberation through humble designing can only be achieved if the dialogic space allows concientização and if the power relation management becomes shared ownership.

Radical listening

Radical listening in Design for Sustainability also stems from the willingness to find non-prescriptive approaches. As radical listening has listening as the very beginning of a project, the design process is defined by what comes from of listening to the actors involved. However, radical listening implies there is one person or group that listens and another group that talks. This is where the position of the people or groups in the modern/colonial structure is important. Radical listening is fitting to when people with more power, open up to listen to voices of oppressed that were not heard before - not heard not for a lack of voice, but for a lack of willingness from the powerful to listen. Similarly, to humble designing, radical listening finds fit when people from colonizing countries engage in design work in (former)colonial countries. However, the position of people and how the process is carried can define whether radical listening leads to concientização and liberation or not. Radical listening happens in situations where big power gaps are present - when a local group relies on the external person to achieve a wanted change and the external person shares power (such as economical and/or political) to make the change possible. This process, in order to support concientização has to highlight and present the power differences between the two groups as a problematic structure to be analysed and acted upon. If the power difference is neglected – seen as natural and irremediable - and not tackled through the listening and through the action that follows, the process does not open for concientização. Furthermore, if the community in lower power position continues to rely on the powerful to achieve their goals, radical listening does not decolonize or change power structures. It becomes therefore a momentary opening for action that closes when the external design group leaves the situation, thus sustaining bondage in the long run.

Conclusion & Discussion

In this paper, we introduced three approaches in Design for Sustainability that are concerned with power issues in design. The approaches introduced were: Design activism, humble designing and radical listening. We

introduced the problematic relation between design, sustainability and the modern/colonial structure of our contemporary world. Using a decolonial lens based on Paulo Freire's (1970; 1996) work, we analysed these three approaches to see how each could sustain or change the modern/colonial power relations. From this analysis, we saw that none of these approaches are naturally decolonial but each has potential for being decolonial depending on the interplay between who, where and how each approach is carried. From the decolonial lenses described here, decolonial (that changes the modern/colonial global structure) and anti-oppressive Design for Sustainability (that does not prescribe) can only be achieved through reflecting on how the design approach affect the people involved in the design process. Thus, becoming decolonial is a relational issue. What is needed from us as designers is a critical reflexive concientização about how our positionality and the design approach chosen relates to power relations and modern/colonial structures – how our position in the world is linked to the creation of the world and of our position in it, as Freire (1970) argues. In this case, it is important to allow the approach to adapt and change as the project develops and the power structures understood, analysed and tackled.

To illustrate this, designers engaging with an external community in a lower power position in the modern/colonial structure could start the process through radical listening. Radical listening would allow the community to define the process and aims of the project. Once the process is defined and started, in order not to keep the community dependent on the designers, a humble designing approach could be taken to manage power relations. Through humble designing the management of power relations in the group would be shared by all actors and a dialogic space (Reitsma *et al.*, 2017) for critical reflection and action would be created. The dialogic space provided by the balanced power relations in the humble design process can then encourage critical reflection and action to allow concientização. This concientização would then allow project participants to start co-articulating (Julier, 2013) issues for critical action to take over power through design activism. However, while this example may read like a recipe, the appropriateness of each approach and how they interplay depends on the situation we find ourselves in and the power relations implicit in it. The appropriateness of design approaches can only be found if design(ers) are conscious and continuously reflecting on its situatedness in relation to power structures.

To conclude, we consider the work presented in this paper as a contribution to a more critical attitude towards the imposed colonialising character that Design for Sustainability often inadvertently assumes. This colonialising character often remains hidden or un-reflected, which we consider as a danger to achieving true sustainable action both on a local and on a global level. In this paper, we applied Freire's decolonial lenses to uncover those often hidden attributes. We see this approach as valuable in order to stimulate a more critical and reflective discourse in Design for Sustainability. We hope this article allows the beginning of a process of concientização of the reader and of design for sustainability.

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Track 2.b Introduction: Design & Democracy

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The issue of design and democracy is an urgent and rather controversial one. Democracy has always been a core theme in design research, but in the past years it has shifted in meaning. The current discourse in design research that has been working in a participatory way on common issues in given local contexts, has developed an enhanced focus on rethinking democracy. This is the topic of some recent design conferences, such PDC2018, Nordes2017 and DRS2018, and of the DESIS Philosophy Talk #6 "Regenerating Democracy?" (www.desis-philosophytalks.org), from which this track originates. To reflect on the role and responsibility of designers in a time where democracy in its various forms is often put at risk seems an urgent matter to us. The concern for the ways in which the democratic discourse is put at risk in many different parts of the word is registered outside the design community (for instance by philosophers such as Noam Chomsky), as well as within (see for instance Manzini's and Margolin's call Design Stand Up (http://www.democracy-design.org). Therefore, the need to articulate a discussion on this difficult matter, and to find a common vocabulary we can share to talk about it. One of the difficulties encountered for instance when discussing this issue, is that the word "democracy" is understood in different ways, in relation to the traditions and contexts in which it is framed. Philosophically speaking, there are diverse discourses on democracy that currently inspire design researchers and theorists, such as Arendt, Dewey, Negri and Hardt, Schmitt, Mouffe, Rancière, Agamben, Rawls, Habermas, Latour, Gramsci, whose positions on this topic are very diverse. How can these authors guide us to further articulate this discussion? In which ways can these philosophers support and enrich design's innovation discourses on design and democracy, and guide our thinking in addressing sensitive and yet timely questions, such as what design can do in what seems to be dark times for democracy, and whether design can possibly contribute to enrich the current democratic ecosystems, making them more strong and resilient?

Redesign democratic debates

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As many scholars have stressed throughout history, healthy public debates are key to the revitalisation of democracy. There is currently a genuine cry to steer away from polarized debates and to work towards consensus. Over time philosophers such as Aristotle (384-322 BC), Arendt (1958), and Mouffe (2000, 2005), have convincingly argued that struggle, torment and dispute are an essential part of a healthy democracy, and that there is a need to design rules to enable these conflicts to be retained. How could design offer us the means, tools and spaces to better articulate differences, and to tackle current polarized debates? We will first sketch how public debates have evolved over time, mapping out the rules that were designed to prevent conflicts from getting out of hand. After that we will investigate a case study and based on the insights generated, try to demonstrate how design could offer us meaningful tools for constructive debates.

Keywords: democracy, concensus, dissensus, debate, design

Public debates through the times

Whenever the topic of democratic debates is addressed, the ancient Greek philosophers and their famous agora in Athens are often proposed as the intellectual and physical starting point of our modern democracy. In *The Human Condition*, Arendt (1958) stresses the importance of conversation in the ancient Greek culture, where well described rules defined who could participate in discussions, and how this should be done in a neutral, non-hierarchical space. Furthermore, according to Arendt (1958), and addressed by many others (Achterhuis & Konings, 2014; Thorpe & Gamman, 2014), the Greeks passion for contest, or agon, (Achterhuis, Konings, 2014, p. 459) was an important aspect of this Greek conversational culture. The focus was not on winning or losing the game, but primarily on the contest itself. A strong respect for the rules, as well as for one's opponents, was a key factor, as without these rules, a contest couldn't exist.

Although Greek debating has played a pivotal role in history, research by Foucault (2011), and by Achterhuis and Konings (2014), throws doubt on the claim that free speech, paressia, was an ancient notion, whereas it was, in fact, not entirely free – only those in positions of privilege had the opportunity to speak out against power. Women were also excluded from public conversations. A recent study by Leclercq (2018) points out that Greek rules for the use, function and regulation of their public space, were under constant negotiation, and that our perception of the agora and Greek democracy as a perfectly organised system, requires some nuancing.

Van Hooff (2011) suggests that we look instead to the Middle Ages as the basis of modern democracy. Throughout that historical period, citizens negotiated constantly with the forces of power, and experimented with self-governance. During these Dark Ages, the so-called Rederijkers movement was a strong driving force behind the culture of debate (Van Dixhoorn, 2006), and the public sphere in the Netherlands. The Rederijkers – a group of writers, poets and artists – organised public contests and performances based on topical issues of the time, using theatre as the main forum for public expression. These public activities – with well-defined

rules on performance and orchestration– were a key factor in strengthening group identities and in visualising communication between the elite and the general public.

Although Van Hoof uses coherent arguments to indicate the Middle Ages as a starting point for the development of the public sphere, the late 17th and early 18th centuries have been designated the golden age of conversation (Van Rijn, 2013, Habermas 1962). During this period, in France, citizens congregated in public coffee houses and salons. Habermas speaks in the widely quoted *Strukturwandel der Offentlichkeit* (1962) about these Tischengezellschaften as trailblazers for democracy, as they were a perfect space in between people's private lives and the spheres of authority. It is from this time onwards that one starts to design civil society (Van Vree, 2000).

Despite the fact that the coffee houses welcomed a wide variety of people, they were not entirely inclusive. All the participants had to be well informed and capable of participating in a rational debate, and, as a study by the Institute for Social Research (Van Dixhoorn, 2006) mentions, common public issues were generally resolved in a 'mob sphere'. Social and economic discrepancies at the time were somewhat tense due to with the fact that parts of society were excluded from the precipitated public sphere (Van Vree, 2000).

It is important to stress here that the culture of, and activities in, coffee houses throughout Europe varied widely. In England, for example, rivals could work out their differences in the coffee houses, whereas in France, the so-called salons were primarily meeting spaces for writers, artists and intellectuals to practice a culture of eloquence (Van Rijn, 2010).

In order to understand modern democracy and the role of debates, we should not omit to mention Rousseau (1712-1778) who considered public participation to be key for a vital democracy. His ideas about a social contract, co-created by citizens, policy makers and politicians, are still not outdated. Rousseau considered debates to be a perfect means of designing and shaping these rules together (Cohen, 1986), however a real social contract did not come into being at that time.

In the 19th century, debating clubs spring up all over Europe. In England these clubs were very popular – by offering a mix of debating and theatre, public performances attracted over a thousand visitors of an evening (Van Rijn, 2010). The debates however, owing to commercial interferences, were somewhat moderate in nature, nevertheless, toward the end of the 19th century, some of the clubs became more radical and, in consequence, were banned.

In the 20th century, journalistic media became the main arena for public debate (McChesney 2004, Starr 2004, Van Dixhoorn, 2006). Journalistic outlets provide information, instigate debates and operate as watchdogs, thus performing a key role in democratic processes (Kovach & Rosenstiel, 2007). Van Vree (2000) however stresses that the mediated public spheres of the media differ considerably from Habermas' *Offentlichkeit* because of the commercial interference with advertising, publishing houses etc., a phenomenon also framed as commercialized publicity (Van Dixhoorn, 2006). Habermas himself already predicted this decline of public culture in 1962. According to him, as with the rise of public culture in the 18th century, boundaries between governance and society would fade and specific interest groups would come to dominate and manipulate the public domain (Habermas, 1962) entailing its decline.

In the 21st century, debates have also moved to the online domain. Whereas in the first years following the inauguration of the World Wide Web, many had high expectations of the open and interactive capabilities of the internet (Aigrain, 2012; Bruns ,2008; Leadbeater, 2009), nowadays more and more scholars stress that our digital culture in fact has a rather polluting effect on debating culture. As the conditions and rules of online public debates are not defined, discussion becomes polarized, polluted (Van Stokkom, 2010) and fragmented (Poell & Borra, 2012; RMO, 2011).

It is not only the quality of online public debates, which are currently the subject of critique, but also the digital platforms that shape the conditions, as their interests are not aligned with public values (RMO, 2011, Van Dijk, Poel, De Waal, 2016). The architecture and design of the platforms define how we debate, as well as how, and with whom, we interact. These platform mechanisms (Van Dijck, Poell & De Waal, 2016) steer and shape our public debate, and since their guiding principles are neither transparent nor fully aligned with public interests, that is troubling.

Furthermore, questions are raised about how public online debates actually are, since it is a relatively small group that participates in online discussions (RMO, 2011, Pariser, 2012), as well as a succession of others, warns about filter bubbles – where algorithms filter out information, based on previous online interest and

searches, and customise information accordingly. This results in diminishing one's chances of being confronted with opposing or unexpected ideas or points of view. Flaxman, Goel & Rao (2013) speak of the rise of ideological segregation, or of the increase of interpretive communities (SCP, 2011). Others are concerned that capacity to deal with opposing views is diminishing (RMO, 2011; SCP, 2001).

In short, we have sketched out how, throughout history, we never fully succeeded in designing a debating culture where everyone was included, where free speech for all was guaranteed, and where we were confronted with opposing points of views. Furthermore, it is clear that the rules on how to debate, or whether or not to express emotions, fluctuated. At the Greek agora however, and within the Rederijkers chambers, the coffee houses and debate clubs, there were clear rules to safeguard the public sphere and make sure that those able to take part in public discussions, understood how to participate, discuss and disagree in an appropriate way. Nowadays, the absence of rules and regulations, and the fact that more and more debates are not publicly visible, as they often occur in an online realm, leads to the question of whether design could be of help in redesigning the rules and conditions for a healthy public debating culture?

Consensus, Dissensus

Arendt (1958) imagined active citizens' participation playing an important, active and reflective role in the common realm. Citizens who collaborate have the 'power' to transform conversations on common 'interests' into deeds. In her vision, this power is not given to them, rather it arises from their mutual collaboration. Unfortunately however, with current affairs such as Brexit in the UK, the Yellow Vests in France and the polarized discussion surrounding black-faced Zwarte Piet in the Netherlands, it appears that people are primarily coming together to express anger and despair rather than finding common ground. Nussbaum (2019) defines our political crises in her latest work as a *Monarchy of Fear*.

For Mouffe (2000, 2005), however, agonism is the basis of democracy. We will always encounter difficulties and conflicts, and so it is necessary to find new ways to deal with them. According to Mouffe, the paradox of our democracy is that we strive for a pluralism that never can be achieved (Mouffe 2000, p.15,16). Consensus is impossible, because the very possibility of consensus requires exclusion - there are always ideas and emotions excluded from the debate. Mouffe argues instead for an agonistic approach to democracy and encourages contestation. Citizens ought to relate to one another as adversaries, exploring where they disagree. They should work out their differences, instead of looking for their common interest.

Mouffe (2005) suggests that contestation should take place in a 'symbolic space', where by means of *artivism* one can work out 'conflictual consensus' – by this she means achieving temporary agreement. We need to 'work through' our differences, defining where we disagree. This means we should not only bring rational arguments into the discussion, but also the emotions that are at stake. Mouffe sees a crucial role for art and creativity in revealing these emotions by means of what she calls artistic activism or *artivism*. According to her, art and politics are not separate entities – there is an ethical dimension to politics, and a political dimension to art (2013, p. 91). Artistic practices can offer space for resistance, for counter forces, Mouffe speaks of 'counter-hegenomic struggles' because they can shape a new form of subjectivity. "If artistic practices can play a decisive role in the construction of new forms of subjectivity, it is because, in using resources which induce emotional responses, they are able to reach human beings at the affective level" (2013, p 96).

Can we use the theoretical frameworks of Arendt and Mouffe to discuss the role of design in democratic renewal? Whilst there has been a substantial amount of literature written about political agonism as a theory, there have been surprisingly few attempts to apply these theoretical assumptions to empirical case studies (Harvey, 2012). During a philosophy working session with the DESIS network (series of philosophy talks) and Design Academy Eindhoven, during the Dutch Design Week in Eindhoven (October 2018), we tried to shape the conditions for Mouffe's symbolic space and questioned how designers could be meaningful in designing new rules for contestation and agonism.

Thinking Through Making workshop

We invited 25 participants (a balanced mix of policy makers, design researchers, journalists and citizens) for this working session. All invitees received, three weeks prior to the event, a positioning paper expressing some of the aforementioned ideas in relation to Arendt and Mouffe. They were also asked to hand in a short statement (video, written, visual) a few days prior to the workshop (figure 1).

Designers can play a valuable role in democratic dialogues by creating platforms that allow multiple voices to be raised and heard, practice-based rather than by purely theoretical means, aiming for exploration rather than determination, and generating friction rather than shiny surfaces.

David Hamers. Reader in Places and Traces, Design Academy Eindhoven

Figure 1: Statements handed in by participants prior to the session. In total 15 statements were handed in. These were used as conversation starters in the discussion.

We kicked off with a short presentation on the philosophy of Arendt and Mouffe, after which the participants tried to work out rules and regulations around a specific (real) case-study, presented by professor Meijer (Governance Studies, Utrecht University). The case concerned an area in the city of Utrecht (Netherlands) for which there are plans to build houses, plans which are opposed by existing residents of the surrounding area who fear a lack of green space, car parking spaces and excessive demands on existing public services.

We divided the participants into three groups of eight participants, one moderator, and a designer to visualise or map the conversation. Within the groups, we discussed how to deal with this particular conflict between current residents, incomers, and city planners – where and how the discussion should take place, and what the role of designers could be be. (Figure 2)

Figure 2: Working session, Dutch Design Week Eindhoven, October 2018

The first group, discussed how designers could help people to better understand different roles of the various stakeholders involved in this case – current residents, newcomers, city council etc. By sharing personal experiences about housing, conflicts with neighbours, etc., it became clear early on in the conversation that we don't have adequate tools to deal with differences. The root cause of these conflicts is the fact that we are not trying hard enough to understand other people's perspective. The participants in the conversation discussed what this implies for designers.

Within design research, the question of how designers should empathise with their users is an important one. One view is that designers need, by means of a 'particular kind of imagination' (Fulton Suri, 2003b), to understand the user. Others (Kouprie, & Sleeswijk Visser, 2009) think that this 'empathy' entails the ability to understand the users, and to be sensitive to them and their thoughts throughout the design process. Some (McDonag, 2006, Batterbee 2004) go even further, seeing it as the intuitive ability to identify with other people's thoughts and feelings, values and inner conflicts, and to internalize these.

Because a clear definition on empathic research in relation to the role of the designer and their methods, is lacking, Kouprie and Sleewsijk Visser (2009) suggest making a distinction between empathy and sympathy –

sympathy being a way of knowing, and empathy a way of relating (Wispé, 1986). This means that, during the process, designers need to be able to switch from one to the other (Kouprie & Sleeswijk Visser, 2009). Before and during the design process the designer requires sympathy or compassion for the users involved but there is no need to internalize their emotions and frustrations through empathy.

In the first group conversation, the participants thought up a process to stimulate 'sympathy' through an intervention to instigate the process of stepping in and out other people's shoes. They came up with the idea of using the game of 'musical chairs' to illustrate that, within participatory projects, we should aim to involve all stakeholders, whilst at times trying to take someone else's seat in order to understand the different perspectives and interests involved.

In a previous design research project at our research lab, we developed a game entitled *Value Pursuit* (Rygh, 2015) to help stakeholders visualise their different interests, points of view and preferences. In the aforementioned distinction between empathy and sympathy, this game, which was brought up in the conversation, would also be way to sympathise with different stakeholders. The participants in the conversation session, felt it requires more than a visualisation and discussion tool to understand other stakeholders, if one is to achieve more empathy. The game of musical chairs should therefore force people into different positions, to enable them to internalize different points of view.

After the workshop, the designers at each table, were asked to come up with a design proposal based on the insights gathered in the conversation. Designer Fides Lapiedere who participated in the first conversation, designed a musical chairs performance (poster, figure 3), stating her aim thus, "After the session I went further with the question of how we could magnify that almost uncomfortable closeness of working together. How we could we train that skill in our daily lives." This led her to the proposal: 'Share a seat, shape a thought… Shape a seat and share a thought.' Her proposal involves a communal activity whereby people take turns being responsible for public tasks.

Furthermore, as the group thought that making things together encourages the empathising process, participants should not only share a seat, but also shape ideas and seats together. This concept relates to Sennett's ideas – in Together (2012) he underscores how making things together doesn't necessarily mean people are working from the same point of view. Often it is the ability of the participants to make it work despite their differences, the social capacity to cooperate together (11), that brings things to realisation – makes it work. To practice this it is necessary to make things together, but as Sennett stresses, this is not easy in a digitalized context where we hardly ever get together and actually meet. To attain satisfying results one needs to overcome a certain form of resistance, "not to fight against it [...] but to employ a minimum force" (2012, p.208). Sennett also makes the distinction between empathy and sympathy stating that, "Along the one path cooperation is a tool, a means; along the other, more of an end in itself. (45)

Figure 3: musical chairs, designed by Fides Lapidiere

The second group discussed the affect that current digital agoras, which result in disembodied conversations, have on debates. Online agoras are becoming places where people express frustrations linked to a general

feeling of abandonment. Our digital interfaces reinforce individualisation – behind the screen there is only space for one person – the result is that we become disembodied from the debate. The lack of physicality in virtual spaces transforms the discussions into intangible narratives where the other becomes somewhat fictional, and the notions of truth and trust are more than ever called into question. Yet, when it comes to tangible spaces, our participants noted that for many years these locations have had a temporary nature, which makes it difficult for people to evolve a more durable relationship with these spaces for holding discussions.

Following the conversation, designer Maxim Benvenuto reflected on the ideas of architect Lefebvre, whose philosophies expressed in the Right to the City (1968) offer a more radical, more problematic, and more open-ended vision of urban politics (Purcell, 2002, p.100). In Lefebvre's point of view, neither architects nor planners, philosophers or politicians, can create new forms and relations out of nothingness. They can only, under favourable conditions, help the formulation and shaping of existing trends (Kofman & Lebas, 1996). Benvenuto observes the design of the Tuilleries in Paris, with a simple layout of the space and chairs, as being very effective for people to meet, linger and take the initiative for 'get-togethers' and conversations. The role of a designer or architect, according to Benvenuto and the participants in this conversation, is to create the conditions and the space for people to do precisely that. These public meeting spaces need be visible as places for people to meet, to discuss the future as well as to reflect on the past.

The third group, moderated by the first author, mainly focused on the role of design in conflicts, and came to understand that we could use public space to articulate differences more precisely. During elections, for example, public voting and debates, people are often asked for simple binary decisions.

The group imagined a 'wailing wall' (figure 4) where various complex ideas could be discussed and made visible in a more nuanced way. The idea came into being as one of the participants brought up the fact that in every conflict there are winners and losers, and these positions might change over time. When losing something you go through different emotional stages that, if better recognised, might make it easier for all involved to recognise what has been lost.

Based on this discussion, designer Martina Huynh created an interactive wall. The wall allows people to express feelings, ideas, thoughts etc. in a more precise way. The wall, installed in a public space, with a spectrum of choice options and colours, would visualise the 'public's opinion' and create a starting point for further discussions.

Figure 4: Wailing Wall to articulate differences more precisely in public space, design Martina Huynh

Reflection workshop

We concluded the workshop by sharing insights. Although each group worked on slightly different subjects, they all expressed the need to find new ways to articulate differences. The first group pointed out how we need to empathise more with different roles and stakeholders. The second group stressed the importance of tangible conversations in a public space where people could work on common interests and different points of view, and the third group emphasised the importance of disagreeing in a more nuanced way, pointing out the importance of tangible and visual designs in public space that could instigate debate.

Although in every session the designer proved to be very helpful in steering the conversation, making sketches, mappings and clustering ideas, the designer themselves were not positioned as an expert with unique knowledge (Schuman, 1993), instead, we emphasised how the co-creation process itself generates unique insights (Manzini, 2015).

The question of inclusion, was also brought up at the reflection session. Although we hoped to create a balanced group by selecting various disciplines e.g. journalist, designers, policy makers and philosophers, the group felt they were more or less part of the same strata of highly educated people with an interest in design research and participatory processes. Especially now that we are starting to realise more and more that differences are key for social innovation and for the levelling of power and resources (Westley, Zimmerman, and Patton, 2007), it is seen as necessary to involve as many different actors as possible in the participatory process. It became clear, that we could have included an even wider variety of people in the conversation.

What proved to be difficult in the workshop was the fact that in the particular case study of a new construction area in Utrecht, the new residents were not visible, and therefore not present in the workshop. Despite this, the other participants did manage to have a meaningful conversation by reflecting on personal examples. Almost everyone had experiences with neighbourhood arguments, or with conflicts in their working or private environment. "There is a huge need to develop tools to deal with conflicts", stated participant Robert Elbrink, policy maker at City of Eindhoven, "Within policy making it is getting more and more difficult to deal with frustrated, angry citizens and we are lacking tools to deal with this." Many others also recognised this through their practices as journalists or researchers.

Thorpe & Gamman (2012) acknowledge that we need to develop new tools for working through conflicts, as there are few in existence. Based on their studies (2010-2011) with the Design Against Crime Research Centre (DACRC) and Central Saint Martins (CSM) college of Arts and Design, they also came to understand that design tools and approaches to deal with conflicts are sorely lacking. This is rather surprising as more and more scholars acknowledge that conflict and dissent should be part of participatory projects (Björgvinsson, et al. 2012; Ehn 2014; Emilson in Ehn, Nilsson, Tolgaard, 2014).

Reflecting on the possible roles and tools for designers in dealing with conflicts, this conversation and the designed outcomes, led us to understand that the thinking through making (Raijmakes, Arets, 2015) session, where thinking and the actual making of a tangible outcome go hand in hand, is a very helpful strategy, as, commented participant, researcher Lucky Belder, "it gives everyone an equal voice in the conversation".

Furthermore, the participants thought that designing open spaces, like the Tuilleries in Paris, for people to get together, and preferably also make things together (Sennett, 2012), would be very helpful. Many participants came to the conclusion that disagreeing in a more precise manner is key, expressing the need to design tools that make more nuanced debates possible.

Prior to many debates the opposing views are outlined. By focusing on the opposites of the spectrum, Brandsma (2016) calls them pushers, we stimulate polarisation. Instead we should focus on the silent, as Brandsma calls them in Polarization. We need to give voice to the silent people positioned in between the pushers, to make their ideas, thoughts and emotions visible. This also relates to the ideas of Rosanvallon (2014) who, in Le Parlement des Invisibles, writes that we should work towards narrative representation, making sure that the stories of the people who are invisible, are told. The participants of this session were convinced that design can be meaningful in achieving this.

To conclude

At a time when, in the context of disinformation, people are losing trust in media outlets and politics, and are unable to find common ground on the internet, which is a virtual space where there are no rules and

regulations to work out these differences, we should start to design the conditions for new public agoras. Designers could give shape to symbolic spaces (Mouffe, 2005) where this working out could take place, using artisvism as a means to also include the emotions at stake, in order to better work through, and out of, differences.

These symbolic spaces need to be designed in such a way that they accommodate differences and offer various possibilities for people to interact. The participatory practice of design can be very helpful here. Options could be co-designed through interplay between different stakeholders (Bason 2014). Furthermore, it is important to acknowledge differences (Mouffe, 2005) and 'work these out' by making things together (Sennett, 2012). We need to get more practice in doing this, by getting together in a physical realm. Finally, designers could help to find agreement in a more precise way, revealing stories of the silent.

Though we think designers have important roles to play in reshaping societal debates we should take a humble approach. Throughout history we have seen that it is very difficult to create inclusive spaces where a wide variety of people feel welcome and where they are able to their express thoughts and emotions and work out their differences. The good news though, is that over the years we are getting better at getting into non-aggressive disagreements (Achterhuis, Konings, 2014). Based on this workshop, and other case studies by the authors, we do however see a lot of potential for designers to apply their capabilities and mindsets to redesign public debates, creating symbolic spaces for people to interact, make things together, using artivism to reveal emotions, giving voice to the silent and helping people to disagree in a more nuanced way.

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An Immanent Criticism of Urban Design in Montevideo

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The debate about the so called "excluding design" has been a focus for applied philosophy for several years. The structure of this debate is constituted by deontological and consequentialist's applied ethics and as well as agonistic democratic approaches. This paper asks for the applicability of these points of view to the particular socio-political reality of Montevideo. Examining this reality closer, I hold that we cannot comprehend the recent aestheticization of the excluding design there through these contemporary philosophical frameworks. As an alternative philosophical procedure, I analyze the aestheticization of excluding design in Montevideo from Rahel Jaeggi's immanent criticism. I hold that this process of aestheticization implies an ideological regressive "form of life". And I also argue that the Uruguayan democracy is affected by this ideological regression. Nevertheless, because this aestheticization is not an exclusive Uruguayan phenomenon, this paper intends to open one direction in applied philosophy of urban design.

Keywords: Immanent Criticism, Urban Design, Democracy, Aestheticization

Problems and Theses

Anybody who visits Montevideo and looks carefully at its urban landscapes will certainly find it has a highly heterogeneous architectural aspect. In particular, houses have a variety of fences, ranging from one with mere aesthetic purposes to notoriously practical uses. Italian style houses are still part of the urban landscapes, with fences clearly made to satisfy an aesthetic function (see Figure 1). The Italian-styled fences work, or almost worked, as aestheticized balcony. A second type of fences, which are now part of both the Italian style houses and the newer one, are those that cover whole windows and external doors. Hence, they obviously have a defensive function. If we pay attention, we can also find a third type of fences, those which are not covering windows and doors (see Figure 2). Moreover, there are other objects in the Montevidean urban landscape, such as flowerpots, garden gnomes, sculptures, and fountains (see Figure 3). It seems obvious that if we see ornaments in the houses' façade, we tend to naturally think that they are merely ornamental, i.e., aesthetically oriented. However, recently, it can see in the city flowerpots and tubes recently and curiously posited in the same place of those unusual situated fences (see Figure 4). Are those new locations contingent? It does not seem trivial that these objects are sometimes located in similar spaces as the third type of fences, what I will call "unfamiliar fences". In fact, the answer is very clear: they are alternative forms of defensive urban design. The flowerpots and tubes do cover neither doors nor windows, and they are not put in their traditional places (see Figure 5). This change of new practical uses for external house objects is a phenomenon that Montevideo only recently experiences, and that has been "excluding design". Fences, flowerpots, and other objects are aimed not only to defend indoor spaces of Montevidean houses, but a lot of them are also strategically positioned to persuade people from resting (setting, sleeping) in outside locations (see Figure 6).

Although this phenomenon has different names, those are determined by two main case interpretations. Excluding design has been recognized around the world by a lot of institutions, such as academy and press. It is

not, therefore, a specific Montevidean social phenomenon. These main interpretations are organized in two sets of interlocutors: those who believe that using excluding design supposes, attending its diverse consequences, a morally wrong decision and those who believe that, by virtue of diverse practical principles, to using excluding design is the better political decision of a community. The use of spikes in London urban area, example that will be analyzed later, has had broad media coverage, big public response from the political authorities and of course a big response within London citizens. To many journalists and academics, those spikes are located by virtue of morally and politically wrong decisions. However, Karl de Fine Licht (2017) has questioned the legitimacy of the axiological negative perspective concerning excluding objects.

Figure 1: Examples of Italian fences (all photographs are mine)

Nevertheless, considering the particular Uruguayan case, I hold that the discussions about the legitimacy of excluding design have missed the point. The counter-arguments very smartly developed by the de Fine Licht against his interlocutors engages us to accept a specific form of applied philosophy. In accordance with his paper, the excluding design can be evaluated through deontological and consequentialist categories, i.e., by which have been called "internal" and "external criticism" (Jaeggi, 2018). In my opinion, however, it is necessary to change the framework to interpret this world wide phenomenon. In response to the perspective of agonistic on design and democracy (Di Salvo, 2010), I state that we can *normatively explain* the use of excluding design around the world. I argue that we can both comprehend and also criticize the excluding design in Montevideo, i.e., we can gain a comprehension of the ideological conditions of Montevidean *forms of life* materialized in urban design objects as, in turn, we can gain also a critical and transformative perspective of this phenomenon. My thesis consists in determining if the conditions which produce solutions to a socio-political problem by aestheticization of defensive objects are the same that produce such a socio-political problem. The corollary of this thesis is that this problem, recognized by the middle class and the Government as socio-political problem related to poverty (and in particular, to homeless people), cannot be solved by the middle class. Moreover, I point out that the city's embellishment process supposes an inner contradictory practice in order to solve such a problem recognized as socio-political one. We assist to a regressive state of social affairs, because the aestheticization of excluding urban design contributes to further invisibilize the problematic process of social polarization that the city has lived for many decades.

Therefore, I will defend here an immanent criticism of such a process of regressive forms of life. I will introduce the main problems which Rahel Jaeggi deals with in *Critique of Forms of Life* as well as her main theses in the same book in order to reorganize the debate on public urban design and democracy. The general aim, then, is to rethink the challenges of designers, given that their products are not isolated from political practices and discourses which produce not formal, but living instances of democracy.

Figure 2: Example of unusual fences in Montevideo

Antecedents: Common Perspectives

The identification of excluding design as such has become more common in the past decades. Particularly, in United Kingdom and United States, journalists have referred to the issues around the appearance of excluding design objects and procedures. In understanding the excluding design in *latu senso*, Robert Moses' architectural design has been used as example not only by the press (Powell, 6 May 2007), but also by academy (Caro, 1975, Schindler, 2015), due to their notably discriminatory approach. For instance, for some predominantly affluent, white New York neighbourhoods, he designed a parkway that was lower than the average of that time. This meant that buses, which were used mainly by poor black people, could not go underneath them. British press has also called attention to the use of spikes in United Kingdom's urban areas (Blundy, 13 Jun. 2014; Omidi, 12 Jun. 2014) as well as the curious case of using a certain pink light in Nottingham in order to exclude teenagers from some public sites (Omidi, 12 Jun. 2014). Finally, to mention one last example, for a time German train stations used atonal music to expulse people with 'anti-social' behaviour (Marshall, 22 Aug. 2018).

The use of architecture, light, industrial design, and music as tools to persuasion to push people from one urban area to another has been interpreted as a process of political, ethical, and juridical ordering. As Schindler (2015) pointed out, the objects of design, in *latu senso*, require an interpretation from a juridical and philosophical point of view, insofar as the laws and social practical rules are not the sole media to order social behaviours. Design is one of the wide set of social resources that rule human practices. Although there are

particular studies of the excluding design which focus on specific urban areas (Fainstein, 2009; Dawson, 2009; Newman, 1996; Petty, 2017), in fact there are not many researches in applied philosophy that have analyzed this specific phenomenon.

Recently, Karl de Fine Licht (2017) published what is probably the latest applied philosophy research on this phenomenon, where the author aims to evaluate arguments that find political and ethical faults of the excluding design. His starting point is a review by Giovanni de Grandis (2013) of Susan Fainstein's *The Just City*. de Grandis mentions Fainstein's previous work on urban planning and justice (Fainstein, 2009), showing that it establishes the whole discussion in relation to the disputes on the application of John Rawls theory of justice into urban planning. According to de Grandis, "Fainstein claims that justice should be the first concern in urban policy-making." (de Grandis, 2013, p. 37). In this text, de Fine Licht puts the emphasis on the discrepancies of de Grandis about Fainstein's theses, particularly in relation to the open field of research which, according to de Grandis, needed more academic attention. With this paper, de Fine Licht aims to evaluate a specific domain of urban policy-making, i.e., to philosophically evaluate the uses of the called "excluding urban design".

Throughout his article, de Fine Licht introduces arguments against the excluding design to then provide his counter-arguments. While academics, politicians, and journalists have stated that the excluding design has negative consequences for the whole society and especially for the well-being of marginalized people, de Fine Licht tries to refute this statements from different angles. First, according to de Fine Licht, (A) we do not know if, or at least it has not been proved that, there are a set of negative consequences from excluding architecture. Second, (B) de Fine Licht argues that even though some social groups are excluded by urban design, those are not necessarily the most marginalized groups of society. Third, (C) the author declares that "... defensive architecture may actually benefit those against whom it is designed." (de Fine Licht, 2017, 32). Fourth, (D) de Fine Licht holds that sometimes flowerpots, benches, fences, spikes, etc., are bought to satisfy an aesthetical desire, not to morally exclude. It is not ever a question of morals, but aesthetics. Fifth, (E) de Fine Licht states that the duty preventing us from avoiding marginalized people do not impel us to meet them systematically.[1] A sixth de Fine Licht's counter-argument (F) says that excluding design promotes the use of shelters, and, assuming that the shelters give to homeless better conditions of life than the streets, then the excluding design supposes the materialization of a ethical right decisions. Finally, (G) de Fine Licht analyzes the argument that asserts that excluding design is ethically wrong, because everybody has a right to use public places. Nevertheless, he objects that every one of us has the right to use the public spaces, but only if the users do not damage the private property of others.

The Problems of the Common Perspectives

In this section, I want to discuss de Fine Licht's counter-arguments, aiming to evaluate the fruitfulness of his whole framework. Although, I do not deny the philosophical richness of deontological and consequentialist's approaches in applied philosophy, by virtue of the particular Uruguayan social situation, I believe that it is necessary to revisit key philosophical notions about excluding design. As I said in the Introduction, the problematization of the debate's framework can be incidental to rethink the role of design in democratic societies and also the role of the designer in her socio-political context.

I will now analyze de Fine Licht's (A), (B), (C), and (F). Starting with (B), it is necessary to say that any problem of exclusion should be considered a real big problem for a community. If we ask which social groups are the most excluded in Montevideo, the answer is not "the skateboarders". Skateboarding is not practiced extensively in Montevideo and the different local governments have created specific spots to practice it. Moreover, there is not a record of relevant social tensions concerning such a practice. Nevertheless, in Montevideo homeless people are strongly ruled by not only private agents, but also by the local and the State Governments.[2] Against the de Fine Licht's counter-argument then, in Uruguay, the groups that are the most socially excluded are also the most economically marginalized.

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[1] However, as we will see later, these last two counter-arguments set out by de Fine Licht are the keys to the better understand of Uruguayan case, because they suppose ideological perspectives which oriented the aestheticization of excluding design in Montevideo.

[2] In Montevideo, as Fiorella Ciapessoni points out, "... the problem of homelessness has become very publicly visible" (Ciapessoni, 2016, p. 113).

I will mention two sources of discrimination towards homeless people in Montevideo. Firstly, the Uruguayan Government has developed a strategy to solve the problem of public safety by promoting. It aims to fight against the insecurity by social integration (Ministerio del Interior [Ministry of Interior], 2012). The expected integration is achieved through the transformation of public infrastructure. For example, one of the most important governmental actions which include, among different spaces, the mentioned skate parks. In contrast, a lot of State buildings have clear excluding design elements, such as fences as those I mentioned above in the introduction of this paper, i.e., they do not cover windows and doors; they cover State public sites where homeless rest. Moreover, the new design of the Montevidean public garbage containers prevent of homeless people from sleep inside them or go through the bins and collect valuables, as these containers turn impossible to take out anything from within them. This governmental strategy is grounded in the law (Poder Lesgislativo [Legislative Power], 2013), which forbids everybody to rest in public spaces. The second source of discrimination has a double aspect. On one hand, to my knowledge there is just one article concerning the excluding design and homelessness (Ferreira, 30 Sep. 2016), i.e., the first aspect is the public absence or omission of the problem. On the other hand, some press journalists have written articles clearly discriminating a heterogeneous and marginalized population in Montevideo (Melgar, 7 Apr. 2016).

Both the Uruguayan self-comprehension and the governmental aim concerning the integration of Uruguayan people seem to clearly contradict the actual circumstances of everyday life. The question is if these contradictions are just mere contingencies or if they are related to a big structural problem. We Uruguayans tend, on one hand, to believe that we are very tolerant to different people (Achúgar, 2002) and, on the other hand, we seek an integration of all of us by designing objects and writing laws which produce the opposite expected effect. No one of these sources of ordering the social behaviour of marginalized people seems to emerge *ex nihilo*. The number of homeless people has increased considerably in the last decade. According to the last governmental census, there are around 1650 people living in the street in Montevideo (Ministerio de Desarrollo Social [Ministry of Social Development], 2016), which represented a 52,6 % notorious increase from 2011. The situation is critical. It seems that we are attending a whole social transformation of the city by virtue of the polarization of people. And, as I said, the Uruguayan press and the academy do not problematize the objects designed to exclude marginalized people and to an extent, they do not regard which are the ideological conditions behind the aestheticized design in urban spaces.

Let us now examine the counter-arguments (A) and (F). If we think that promoting shelters can benefit homeless people, we can also think that to promote excluding design has positive consequences. de Fine Licht's counter-argument (F) can be an answer to the counter-argument (A), because if excluding design foments the shelters and the shelters can benefit marginalized people, then it is possible that the excluding design actually helps them.

Nevertheless, that statement is easily debunked if we take into account the Uruguayan situation. In Montevideo, as in many other cities, homeless shelters aim to contribute to the re-integration their users into a 'normal' life. However, they face big issues. Psychiatrist Esteban Acosta stated in an interview done by journalist Betania Núñez that many homeless people in Montevideo suffer 'hospitalism' or 'shelterism', and the psychological, social, and psychiatric' literature on the topic supports the diagnosis (Núñez, 30 Sep. 2016). According to Arapoglou, Gounis, and Siatitsa (2015), the 'shelterisation' is:

> *[...] a type of institutionalisation specific to homelessness refers to the effects of prolonged dependency on institutional regimes that tend to colonize a homeless person's everyday routines in ways that render long(er)-term life paths and objectives impossible even to contemplate. Contrary to what may appear obvious meaning of the term, we view shelterisation as a structural condition [...], there is ample documentation of the ways in which these settings, as well as the wider array of emergency services for homeless persons, capture the time and exhaust the energy of those that have to stay there. (Arapoglou, Gounis, & Siatitsa, 2015, p. 140).*

It is unacceptable to think that shelters, at least in Montevideo, have only benefits to homeless people. de Fine Licht's consequentialist and deontologist approaches do not help us to decide the legitimacy or arbitrariness of excluding design in Montevideo, because the excluded population are mainly, it seems, a marginalized one and because the benefits of exclusion are not clear. The consequentialist's ethic theories, on the one hand, hold "... that normative properties depend only on consequences" (Sinnott-Armstrong, 2015). As we examined, the consequences of excluding design in Montevideo can not be the foundations to accept such a design. However, to deny these foundations, *ipso facto*, do not allow us to affirm the opposite thesis. Moreover, the deontological approach, on the other hand, does not allow us to understand, by its proper definition

(Alexander & Moore, 2016), the socio-political conditions of excluding design in Montevideo. This approach constitutes an example of "external criticism" (Jaeggi, 2018), because the choices are judged by normative principles which are not intrinsic of the forms of life in question. In other words, it does not matter what the context is, the norm used to judge choices is ever employed.

 Hence, we need to satisfy two theoretical conditions to examine the excluding design in Montevideo. 1) The empirical information of the social situation in Montevideo seems relevant to analyze the excluding design, because we are facing big socio-political tensions. Therefore, the evaluation of excluding design needs an "internal" approach, i.e., to comprehend the proper characteristics of Uruguayan forms of life. 2) Nevertheless, such an evaluation requires transcending the empirical conditions which merely describe the phenomenon in order to achieve, in turn, a normative evaluation of such a particular phenomenon. Then, the internal criticism does not allow for itself to satisfy this second condition, because an internal criticism of forms of life, according to Rahel Jaeggi (2018), inhibits the possibility to transcending the *statu quo*. i.e., it does not question the initial conditions of one community's problematic practices.

Nevertheless, the contemporary theoretic landscape offers an alternative to consequentialists and deontologist's ethic approaches and also to the agonistic democratic approaches. DiSalvo, for instance, holds a perspective on design and democracy from the Ernsto Laclau and Chantal Mouffe's theses (Laclau & Mouffe, 2001). However, as Rahel Jaeggi points out (2018), we need not only to recognize the different conflicts and tensions of democratic forms of life, but also the possibilities to rationally thematize and discuss the achieved solutions which some forms of life employ to solve their socio-political problems. The idea of normativity cannot be strictly founded on the agonistic perspective of Chantal Mouffe (2016). Hence, it is difficult to satisfy the two theoretic conditions from her theoretical point of view[3]. For these reasons, I propose an immanent criticism to understand and evaluate the excluding design in Montevideo. I look for the comprehension of the contradiction between the discourses and the practices – we can remember, for example, the contradiction between, the self-comprehension of Uruguayan people and their practices, as well as the government's contradictions between its aims and its laws and practices. But I also look for to demonstrate that these contradictions are not contingent ones, but that they are structural ones.

Figure 3: Example of traditional ornamental fountain

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[3] "In fact, it seems to me that contingency is incompatible with any particular normative claim that might follow from it." (Cross, 2017, p. 189). Ben Cross, by virtue of his own reasons, would be accept the critical theses of Rahel Jaeggi against the possibility of a normativity in a agonistic democratic's framework.

Aestheticization design as a Regressive Form of Life

I argue that Rahel Jaeggi's thesis is the best alternative to the discourses on deliberative democracy, i.e., to those conceptions which engage us with the principle of ethical abstinence (NOTA AL PIE) and I consider it to be the best alternative to agonistic democratic approaches, because Jaeggi recognizes the inherent conflictive processes of any form of life, and also she also recognizes the normative inherent character of them. The immanent criticism can make the social structures visible. Moreover, the visibilization of the contradictoriness of some social practices would open the social black box processes to alternative solutions. In this way, the naturalized solutions inherited by a form of life leave behind their fate character. In other words, to visibilize the inherited character of socially interpreted processes of problem-solving (social practices or forms of life) contributes to determining a *factum* as a historically interpreted problem-solving process. As I think, the whole framework of an immanent criticism allows us to evaluate the entire ideological conditions of a democratic system. Such a framework makes possible to determine the social tensions, identifying, in turn, their deep social axiomatic. All of that also gives the conditions to problematize the forms of normativity and rationality involved in social practices. In this theoretical context, the designers confront the challenge of reflecting on their role in a global form of life where, and by, they produce design objects. Clearly, that reflection can be the starting point to problematize the nature of the design objects as the materialization of forms of life. Therefore, I think that the hard problem of designers facing our democratic political organizations is precisely to ask themselves about the global process of social transformations where they live.

Following the example of immanent criticism analyzed by Jaeggi (2018), we can evaluate the excluding design in Montevideo. As Jaeggi points out, Hegel recognizes a structural relationship between the independence of modern individuals and the dependent character of their interests to social institutions – essentially, the market. The procedure of immanent criticism supposes, therefore, three pre-conditions and three active procedures as such. Firstly, the immanent criticism recognizes the necessary relationship between some social norms and practices, and then its primary task is to identify the no contingent character of such relationship. Secondly, the immanent criticism recognizes that one practice is necessarily constituted by a set of norms, and then its second task is to determine such a constitutive character. Finally, the immanent criticism finds the inner contradictoriness character of a practice by virtue of its constitution by a set of norms. And then, such contradictoriness character is not contingent, but structural. Therefore, the immanent criticism claims to demonstrate the structural character of the practice's contradiction by virtue of a norm. By this procedure, the evaluative moment of immanent criticism emerges from the research on the interpretations that one community makes of itself and the practices and products developed and associated to these interpretations. The process of transformation of a practice, then, is a process of the transformation of the interpretations of problems and solutions which a community has to deal with. The role of the Thomas Kuhn's thesis on scientific progress is not minor in Jaeggi's thesis. According to Kuhn, a successful theory depends precisely on the interpretations of one problem made by a scientific community. If one community holds the high capacity of a theory to solve its own big problem, then such a theory becomes the best candidate to guide the further subordinate problems and then to pilot successfully the future scientific researches. One theory is successfully only if it is capable to formulate a problem that is, according to its community, solvable without turning less economic or more obscure their original formulations (Kuhn, 1996). Hence, in analogous way, one form of life is successful if their solutions to its big problem do not imply some sort of regression, i.e., if they obscure or invisibilize more and more the social axiomatic structures which produce such a problem.

As I mentioned above, Montevideo not only has different fences, but also has ornamental objects situated in usual places. If we think about the differences not from a synchronic point of view, but by attending the increase of homelessness in Montevideo it is possible to hold one diachronic thesis. The fences have historically changed their function, because they reflect the transformations on the relationships among the Uruguayans. In the first place, we can recognize a first moment in the Montevidean 20th century when the fences were becoming aesthetic objects oriented by aesthetic functions (to use a balcony). Then, the defensive fences emerged, due to the socially interpreted problem of insecurity. By virtue of such a problem, the fences started to cover the whole doors and windows of Montevidean houses and buildings. More recently and in a third stage, we witnessed the emergence of fences that do not cover any door or any window. These fences clearly have a defensive function, but such a function does not seek to protect the indoor of houses. These fences do not fight, therefore, against the insecurity itself. It seems that these fences are designed and positioned to push homeless people out. As we can see in the Figure 2, these fences cover outdoor places used by the homeless to shelter themselves from wind, sun, and rain. Therefore, the problem is not only the insecurity, but the disagreement or distaste, because it is also a question of aesthetics of poverty, concerning

other forms of life. But, finally, we have a fourth big social transformation. In middle-class neighbourhoods the flowerpots and tubes are putting in the same places that could serve as potential shelters. But why are these decorative objects chosen to the detriment of the fences? It is just a mere variation of the practical decisions involved in using the newer fences? It is possible to find the primary answers to these questions in a lucid paper by James Petty (2016).

Treating the famous case of London spikes (Petty, 2016), if we examine not only the press reactions to these spikes in London, but also the point of view of the residents and The Mayor of London, we can conclude that one of the main focuses on such an issue is an aesthetic one. Quoting a Leonie Sandercock's paper (Sandercock, 1997, p. 30), Petty argues that the spikes controversy visibilizes the imaginary shared by some London citizens, i.e., the ideal image of a clean, sanitise, attractive, and safe London. This ideal image of London involves a tight implementation of the order, in particular, of urban control. However, this procedure visually shapes the urban landscape, sometimes contradicting the ideal image of the city. The spikes issue formulates, in *latu senso*, a contradiction between the ideal images of London and the seeking of the city's security. This case also sheds light on the protests against the installation of spikes, because they would affect as the homeless do such ideal images of the city. If we reflect on that, we can state that the process of aestheticization of the cities implies the update of the social answer to the spikes issue. If the materialization of social control is aestheticized, then we can shape a city where social tensions seem to be inexistent. Nevertheless, this process of aestheticization is a worldwide tendency. Choon-Piew Pow (2017) shows that the governmental urban city planning in China is increasingly oriented by aesthetic virtues, in particular, the idea of updating the harmonious experience of cities. In a previous work on the Shangai's process of aestheticization, Pow holds that:

> By being thoroughly aestheticized, class relations are depoliticized and reduced to questions of lifestyle, consumption patterns, taste, and visual pleasure. Ultimately, the paper contends that in gated communities such as Vanke Garden City, the celebration of landscape beauty and appearance masks the interrelatedness of issues of aesthetic and class identity on the one hand and broader problems of urban inequality and segregation on the other. The seemingly innocent pleasure in the aesthetic appreciation of landscapes and the desire to protect the beauty and aesthetic qualities of landscape can act as a subtle yet highly effective mechanism of social exclusion and the reaffirmation of elite class identities.(Pow, 2009, p.387).

Figure 4: Example of fences and flowerpots covering possible shelters

If an immanent criticism implies the determination of a structural no-contingent relationship between practices and norms, we find the relationship between the aestheticization and "urban inequality" around the world. It seems, then, that the Uruguayan process is not an isolated phenomenon of aestheticization of political ordering of urban spaces. In the imaginary of peaceful city produced by the Uruguayans, Argentineans, and Brazilians we can find Punta del Este as an exclusive beach town in Uruguay, hosting thousands of tourists from Uruguay, Argentina and Brazil. It is the most aestheticized city in Uruguay and the reasons for that is precisely associated with the idea of relaxing life which, in turn, supposes letting behind the urban landscapes of very conflicted places as Montevideo (Uruguay), Buenos Aires (Argentina), and Porto Alegre (Brazil). In fact, there is evidence of the increase in fences in public spaces in Buenos Aires, and specifically by virtue of the recent political and social conflicts in Argentina (Chronopoulos, 2014). Such an idea of a relaxing life is not clearly possible under conditions of homelessness which are not only the homelessness itself, but also the visual and material signs of such homeless people. The aestheticization of Montevideo has its model in Uruguayan beach towns as Punta del Este.

Figure 5: Example of flowerpots covering a possible shelter

Nevertheless, what is the nature of the structural relationship? I think that it is necessary to determine more precisely the perspectives of Petty and Pow from the Jaeggi's immanent criticism. The ideal of harmonious city materialized in aestheticized objects implies the conditions which produce the problems to the aestheticized solutions come from. The fourth phase of the middle class form of life supposes the pacification – control – by virtue of aestheticization of the urban landscape. If we attend to the de Fine Licht's counter-arguments (D) and (G), we can hold that, on the one hand, the politics are usually excluded from the aesthetics and, on the other hand, it seems that what the Montevidean middle class wants to do is to avoid any sign of poverty from its visual urban landscapes. If we put together both counter-arguments, we can hold that the aestheticization implies the exclusion of politics from the horizon of Montevideo's visual aspect. If we argue with Jaeggi that

the democratic system not only supposes the integration, but also the disagreements of different forms of life, the aestheticization has its ideal image in the dissolution of the socio-political conditions of democracy. Let us consider the moments involved in such a process. Firstly, the aestheticization of Montevideo seems to imply ideals of full safety, purity, health, and harmony of the city. Secondly, these ideas imply the dissolution of other divergent forms of life, especially the marginalized ones. Thirdly, the diverse forms of life are constitutive of politics and, in particular, of democracy according to Jaeggi's perspective. Fourth, for Montevidean middle-class, aestheticized design is the counter face of democracy. Fifth, the middle class seeks to solve the disagreements with others by using aestheticized design. Sixth, the aestheticized design, therefore, supposes both the claim to solve the disagreements and the dissolution of other divergent forms of life. In other words, the aestheticization supposes the solution of a problem and also the violence that it pretends to solve.

Figure 6: Example of tubes covering a possible shelter

If we consider once again these moments not from a synchronic point of view, but from a diachronic one, the aestheticization turns itself a late moment of the invisibilization of the disagreements of different forms of life. The fences do not cover themselves as defensive objects, i.e., they do not hide the disagreements. Therefore, they are urban signs of different forms of life in conflict, although these conflicts were understood as the obvious material exclusion of homeless. However, the aestheticization goes deeper in the divergence, as there are no any public sign of conflict. Because it does not produce an explicit sign of conflict, it presents the apparent image of the solution of its original problem. In this way, the aestheticization of excluding design strengthens the problem and, then, produces an ideological image of society – an inverted image of society. Hence, it is not a successful moment of the problem-solving process, because it does not visibilize the different phases of the conflict and the different interpretations of these phases. Therefore, we can say that the aestheticization of urban Montevidean design has a regressive nature.

Conclusions

If we do a close examination of the Uruguayan social reality, the deontological and consequentialist's ethic approaches to excluding design do not allow us to comprehend the relationships between democracy and design in the country. There is evidence that does not support de Fine Licht's counter-arguments against excluding design. The whole debate on deontological and consequentialist norms is under discussion, because the most excluded people in Uruguay are marginal and because such people are tensed by the Scylla and Charybdis of, on the one hand, being expulsed from streets by civil, private, and governmental dispositives of control and, on the other hand, the harsh living conditions of shelters. Nevertheless, it is possible to give another framework to examine and also evaluate the legitimacy of excluding design in Montevideo. The immanent analysis proposed by Rahel Jaeggi can satisfy the double nature of a descriptive and normative philosophical framework. Proceeding to analyze the Uruguayan aestheticization of urban design, it is possible to recognize this political role of such a design. It cooperates to increase the process of social polarization, since it covers the social coercion into an aesthetic turn. This aesthetic turn contradicts, for its part, the deliberative, agonistic, and immanent perspectives on democracy, because, firstly, it invisibilizes the social conflicts, then, secondly, it does not allow a public discussion about it and, thirdly, because it does not visibilize the historicity of its ideological structure. Therefore, such aestheticization inhibits the political development of democracy in Uruguay.

Although this paper deals with the different phases of Uruguayan social changes, the aestheticization of urban areas is not an exclusive phenomenon of Uruguay. This paper aimed to methodologically contribute to analyze the particular characteristics of the problem-solving tendencies embedded in the world wide aestheticization. Therefore, no matter the designer's particular social circumstances are, the most political challenging problems of design are, firstly, the self-consciousness of the forms of life materialized in projects and design pieces and, secondly, to question the political legitimacy of these projects and pieces. The critique of forms of life, therefore, is also one of the designer's tasks. The awareness of the ideological framework of design's practices is a condition to question the world wide process of the depolicitization of democracy triggered by aestheticization.

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A Framework for Civic Conversations

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Systemic changes in people's relation to democratic government and governance have been widely noted over the last 40 years. Concurrently, participation in civic life has declined. Drawing from approaches in service design, this article proposes a design-led structure for democratic engagement that serves two goals: the provisioning of people's expertise on policy decisions for governmental use, and scaffolding of civic life. The paper details a structure that has been tested and refined in over 30 community meetings, and suggestions for effectively evaluating meeting outcomes.

Keywords: civic life, conversation, deliberative democracy

Introduction

For democracy in the United States, and for democracies across Europe, it is becoming increasingly apparent that a combination of factors is contributing to a larger trend towards democratic deconsolidation. Over the last 30 years, increasing numbers of voters make critical choices informed by single-issue political organizations, vote for so-called populist candidates, or align themselves with political parties that claim to be anti-establishment (Foa, Mounk 2016). Social media networks like Twitter, Instagram, Facebook and YouTube have become a site for increased participation in political debate (Vaccari, Chadwick, O'Laughlin 2015), but that participation does not correlate to increased comprehension of the issues at stake (Kalsnes, Krumsvik, Storsil 2014).

Further, democracies exist on a substrate of a larger, supportive society. Yet the mid-level structures — civic organizations — that contribute support to civic life have been in decline over the last 30 years (Putnam 2000). In a review of recent scholarship of this critical mid-level of US society "What We Do Together" (2017), a report prepared for the US Senate Joint Economic Committee, details the decline of what the authors refer to as associational life over the last 45 years. The lenses through which associational life is viewed in this report are: families, religious congregations, secular communities, and workplaces. Across these domains, the report cites a trend where Americans "prioritized individualist goals and professional pursuits over the sustenance of yesteryear's robust associational life." (p45) Further, in the quarter-century since he conceived of it, Manuel Castell's (2010) space of flows (the digital communication network enabled by the internet and small computing devices) has displaced more traditional social structures organized around places. In Castell's space of flows digitally organized communities of affinity replace neighborhoods as key social units.

While it is not within the scope of this article to offer a full treatment of either democratic deconsolidation, or the implications of the network society and resultant major transformations of social life globally and in the United States, it is within this frame that contemporary democracies must work. Municipal governments are inherently place-based, and depend for their functioning upon an infrastructure of support that is also place-based. Municipal governments supply communities with very direct and instrumental needs, and rely upon residents of the community for feedback that directs and shapes the provisioning and functioning of

government services. In short, while the network might facilitate a set of relationships that are far-flung and time-shifted, municipal governments operate in a world that is circumscribed by local city limits, imminently material, and bound up with concerns of provisioning need to community members. In a set of social structures that were more place-based, where relations were structured principally around proximity, matters of concern (Latour 2004) might have been encountered at the workplace, in the parent-teacher association, again at the bakery or the greengrocers, and again at church. This suite of contiguous but independent institutions engendered more replete relationships based upon spatial proximity. Essentially, people worked, participated in religious and civic life, engaged with the schools near the neighborhoods where they lived.

However, many different agencies shape communities, besides the once dominant consideration of being physically proximate to one another. To put it plainly, geographic territory no longer exerts a dominating influence over how communities are formed. Yet, democracies are still primarily organized around the stewardship of a particular geographic zone, and constructed with hierarchical levels of authority within progressively larger geographic zones. Where participation in democratic government and governance might have once been supported by a number of civic organizations, membership in these organizations is declining as people elect to participate in more social structures organized around place-independent networks.

In 2012, speaking at Carnegie Mellon University, Victor Margolin offered three ways to consider the relationship between design and democracy. In Margolin's characterization, design of democracy is engaged with designing the institutions of democracy itself — improving the processes and services government provides; design for democracy is engaged with designing the mechanisms of citizen engagement such as voting; and design in a democracy, where the goal of designing is to support actions that are more broadly considered to be democratic in nature, or supporting positive outcomes for a broad range of community members. Margolin enumerates some exemplars of this: maintaining a clean environment, the provisioning of basic needs to people experiencing challenging circumstances, providing quality healthcare. Extending this dialog, Ezio Manzini with Margolin (2017) author an open letter to the design community, exhorting designers to take a greater role in countering trends damaging to democratic governance and participation. Margolin and Manzini add another aspect, highlighting the practice of participatory design: design as democracy.

With the challenges posed to civic organizations, the critical substrate of democratic institutions, in developing new social structures, residents have lost some of the literacy that civic organizations served to exercise and reinforce. Ultimately, this kind of designerly understanding alone cannot "save" civic organizations — the middle tier of social relations — but designerly understanding can approach democratic engagement by scaffolding the interactions of constituents within government. While this middle tier of social relations has begun to deconsolidate due (in part) to the organization of new types of social relation, design can serve to reshape democracy to be more accommodating to participants, as well as support people to reconnect with the local.

The Civic Conversation

Government can, however, work to more effectively support people to engage with policy matters, and can help people to engage more actively with governance and government, and offer scaffolded opportunities to reinvigorate participation in civic life. Supporting civic life could come in the form of design to support the practices of democracy. Margolin & Manzini's categorizations offer an effective way to think about how designers might support democratic institutions, and we designers must also think how design might effectively support democratic practices. One key way that government can help people to connect more meaningfully with civic action is to help people to surface their values in relation to matters of concern that lay before the government. A form that government can engage in to promote this social infrastructuring, is effective design and implementation of a civic conversation.

Conversation is a key component of human activity and civic life. In the context of governmental practice, conversation and speech-acts are components found everywhere. Debate, deliberation, speech making, negotiation, argument are all conversational acts. Conversation is a key act of governing, the fundamental act of human communication—and a principal way that human beings relate to the material world. The offering that occurs in James J. Gibson's affordances (1979) could be interpreted as the opening a type of conversation between the user and the object. Architect Louis Kahn advocated conversations with materials as a mode of discovery for designers (Turkle, 2011, quoting Nathaniel Kahn, 2003). The conversational mode of interaction—two or more humans conversing with one another—is the underlying principle for mediated

communication technologies like email, text-messaging, social networking, and for proximate communications like meetings and expert consultations.

Conversation theory, pioneered by Gordon Pask, created structured definitions and relations between concepts like agreement, understanding, and consciousness (Pangaro, 1996). Conversation theory has cybernetics at its foundation. It is a central aspect of design practice and encompasses the goals of designing for communicating. Within, and tangential to the field of design, practitioners and scholars such as Hugh Dubberly, Paul Pangaro, Terry Winograd and Fernando Flores, Jeff Conklin, and Horst Rittel have examined the theoretical underpinnings of conversation—both as a model for designing, and as a central concern of cybernetics. Following John Searle, Fernando Flores and Terry Winograd developed Language/Action perspective as a way to structure conversations for action to help participants move from irresolution to resolution in a conversational situation (Winograd & Flores, 1986).

Conversations are the medium through which people collaboratively deliberate, or together, make sense of complex situations. Deliberative conversations occur in every knowledge domain. A wide array of academics have researched the deliberative conversations that occur in their own knowledge domain and have provided models and best practices for practitioners to engage in those conversations. James Fishkin (1991), Robert Cavalier (2011), and Elinor Ostrom (1990, pp. 88–102) have offered models for democratic deliberation; these models have been operationalized through the work of Carolyn Lukensmeyer (2007, 2017) and others. Deliberative conversation is a particular type of conversation that has the following characteristics:

Participants are engaged in face-to-face discussion.

Participants conscientiously raise and respond to competing arguments.

Participants arrive at considered judgments about solutions to public problems.

(Fishkin, 2008)

Fishkin's definition of deliberation contains some key words—which we will return to later—that imply how designing to support this format can proceed.

Through the work with the PDD, I, working with Dr. Robert Cavalier (political and pragmatist philosopher, senior faculty at CMU and director of the PDD), Tim Dawson (then a doctoral candidate in CMU's English/rhetoric program) and Selena Schmidt (a public engagement consultant with the Public Broadcasting System) developed an agenda-based approach to serve as the framework for two series of meetings for different clients. Cavalier had been approached by the City of Pittsburgh to help plan new capital budget hearings. Once the initial development of the framework was complete, the practical work of designing and hosting the specific meetings was delegated to me and Dawson. PDD agreed to host the second set of meetings as part of a study in collaboration with the CMU Remaking Cities Institute (RCI). The goal of the meetings was to develop information for the Pennsylvania Department of Transportation (PennDOT) to guide further development along Route 51. At the time, PennDOT was already engaged with the CMU Robotics Institute to analyze traffic flows and develop algorithms to increase throughput and reduce pollution. As a component of that larger infrastructure, the RCI applied for and received funding to create a master plan to guide development. RCI engaged the PDD through Cavalier to conduct the community engagement efforts along the corridor. Dawson, Schmidt, and I were recruited to support this endeavor. The community meeting format was developed collectively over a series of meetings by the PDD group in consultation with architects from RCI. The PDD group elected to use this format for nearly all subsequent meetings.

This format is designed to accommodate a larger number of participants at a formal meeting. Over the course of three years conducting meetings in this format, we have hosted between four and 162 participants at a single meeting. Generally speaking, from the perspective of a participant, a deliberative community meeting designed in this framework takes about 2½ hours. This was done for several reasons: it was generally felt that the longer form of meeting (all day, or two days during a weekend) was extremely burdensome for participants (especially lower-income participants), and not practical from the perspective of executing events that were either unfunded or poorly funded. Perhaps most significantly, the time window was chosen because the City of Pittsburgh hosted similar meetings in the past using that time window, and 2½ hours would fit neatly.

To operationalize Fishkin's deliberative characteristics, PDD works with the following structure for each deliberative forum.

Elements of a Community Deliberative Forum
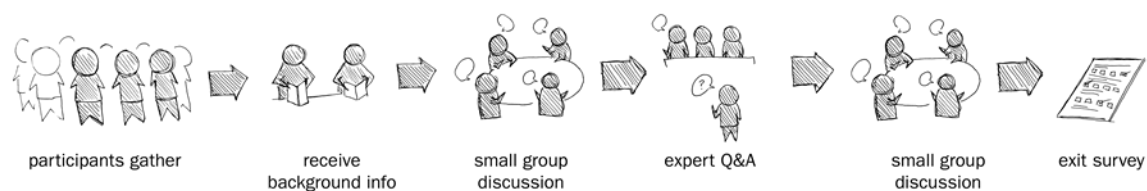
Figure 1: the 6 aspects above are the minimal elements of a deliberative forum

Arrival: **participants gather** and receive table assignment and briefing documents from event staff.

Informal Greeting: participants are greeted by the table moderator, **receive background information** and given time to meet other participants and read the briefing document. We strongly encourage the convening organization to set aside part of the budget for a light dinner for the participants. If food is provided, the participants eat at this time.

Pedagogical Introduction: a nonpartisan "teacher" gives participants a short overview of the topic area(s), what is to be achieved by the deliberation, and an explanation of how data generated by the participants will be used.

Deliberation: led by the table moderator, participants engage each other in free-form **small group discussion** of the agenda issue(s). The briefing document is referred to as a source of additional information.

Question Writing: led by the table moderator, participants write a question or questions to pose to the expert panel for the Expert Questions and Answers (Q&A).

Question Asking: participants pose their **questions to the expert panel** and receive answers.

Post-event Survey: participants fill out an **exit survey** indicating their opinions on the agenda issues, suggest new agenda issues.

Departure: event staff thank participants for their time and thoughts. Participants chat informally with each other and expert panelists.

All of the elements above were iteratively and intentionally designed to create a "smooth" experience. The meetings are staffed by a number of volunteer facilitators and registrar(s), an emcee, a member of the convening organization who shares key information about the context of the discussion, and a panel of recruited experts.

This information is offered for background and a richer understanding, as the focus of this paper will be principally my reflections on the design process that supports these fora and directions for further research. During the development of these fora, I was involved principally as the document designer and collaborated iteratively with the writer (Dawson) to develop briefing materials to support the conversation. This paper details my personal experience with writing, designing, and developing these critical pieces. Data were collected through participant observation throughout the development and planning process. Further data were collected at public meetings, at a post-event debriefing with the table moderators, and with a post-event debriefing with city, county, and committee representatives. During this process, I observed several aspects where the design process of the creation and iteration of briefing materials impose a kind of discipline on the way organizations understand the issues they deal with, as well as the way the deliberative process is informed and even structured by the design process.

Developing supporting materials

Designing a deliberative forum begins with the question, "What is it that we want to know from the people we are convening?" One approach to answering this question is that the initiating organization (city government in this case) has a plan or concept that they want analyzed or validated by a representative group of subjects. In this case, the initiating organization wants to use the deliberative forum as a filter that will pass through validated information, goals, or approaches (Fishkin, 2008). In another approach, the organizing group wants to understand how citizens might prioritize a set of goals or actions, as pertains to their local situation. On some occasions, the organizing group has a general concept for engagement but no clear questions. One

approach that was useful in this situation, is to frame the civic conversation as a learning opportunity, asking what the conveners might want to learn from bringing this group together.

Regardless of the content of this critical question, one of the first steps in preparing for a civic conversation is to prepare a briefing document, which contains background information necessary for the participants to have a legitimate and conscientious conversation of the matter(s) of concern. In the course of the design process, this briefing document becomes a MacGuffin, the object which drives inquiry, prioritization, and the structuring of many other components of the forum. The MacGuffin is a dramatic plot device used in films to introduce tension in the plot and drive action. The reason the character's behavior is driven by the MacGuffin is usually left unexplained. The device was first introduced by Alfred Hitchcock in his 1934 film The Man Who Knew Too Much (Ackroyd, 2016). Following is Ackroyd's description:

> It is, to use a more familiar phrase, the red herring, the device that sends the plot and the characters on their way—such as the attempt to assassinate a foreign leader in this film—but remains of little or no interest to the audience; it is simply an excuse for all the activity on the screen. (Ackroyd, 2016, p. 61)

Dan Hill (2012), brings to design the concept of the MacGuffin as a force at work in design projects. Hill asserts that the development of a relatively unimportant object can drive forward a strategic process:

> The MacGuffin helps drive this process through its gravitational pull, through its requirement for rigour. [...] It is a classic MacGuffin; not especially relevant in itself, but the entire plot cannot exist without it. It is the reason for the entire story, and yet beside the point. The wider story is ultimately more interesting, more affecting. (pp. 55, 57)

The briefing document is used in the forum, but the participants view the briefing document as ephemeral and not a central aspect of their experience. The process of creating the briefing document, however, drives regular meetings with all stakeholders in the project and forces an in-depth examination of the issues and the language used to describe the issues. These issues in turn structure the agenda for the deliberative event and prefigure the questions that are on the exit survey. The briefing document is that thing that, as Hill states, has enough importance that the design team will be compelled to carry it forward, and will also drive the development process. Though Hill's example of MacGuffin-in-action drives a strategic goal that is largely extrinsic to the design process, the writing and design of the briefing document drives learning and crystallizes a new understanding of the issues within the client organization.

Some challenges of designing for civic conversations

Approaching designing for a civic conversation holds key differences from other design activities. If a designer did not approach the matter in a considered way, a civic conversation might mistakenly be thought of as a conversation between two groups: an expert (members of government) and a client (residents). Yet in actual practice, considering a conversation such as a civic event, the dyadic model of the expert/client expands into a more complex structure. Agency for decision making is effectively owned by elected officials or government staff. The civic conversation exists to provide input on that decision for residents access to the agency of the elected official or government staff, otherwise understood as influence. Minimally, residents gain the perception of agency. While the decision rests with agents of the government, the stakes of that decision are born in different ways. Residents are at the forefront of people who experience the consequences of decisions.

As described by Pelle Ehn (2008) the two central values of participatory design are legitimating democratic participation, and informing a design process through participants' tacit knowledge. Though civic conversations are not participatory design, civic conversation is a closely related activity. Within the context of the work I have done, the central value of an event is to evoke the gradient of opinion and understanding that exists within the room. Because participants construct their perspective of the issues based upon relations to others' perspectives, (Spinosa et al., 1997) this activity is highly relational in character.
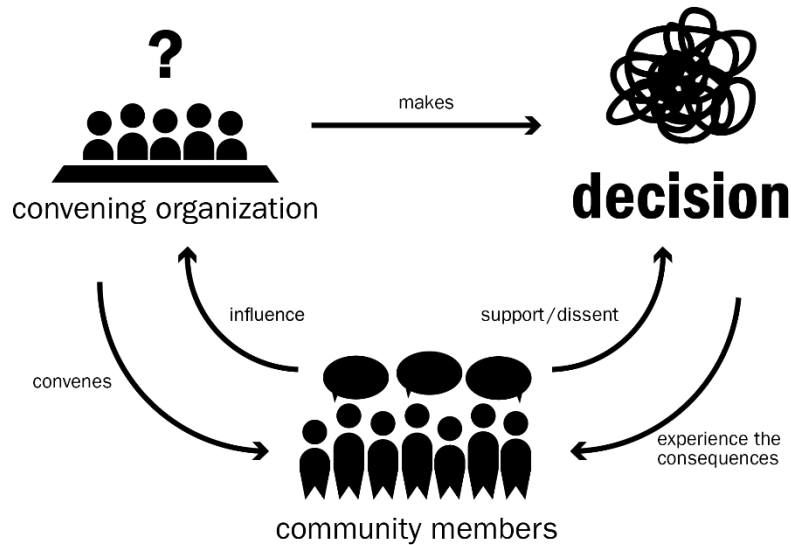
Figure 2 Civic conversations are more complex than the more common expert/client decision-making process.

These civic conversation events can provide a rich psychosocial frame for participants. The act of coming together as a community to articulate a shared future is a powerful metaphor. In his 1991 book, Human Scale Development, Manfred Max-Neef, a Chilean economist, pens a most compelling and thoroughgoing systemic architecture of human need. Max-Neef's approach understands needs across nine categories of human engagement, and four contexts. He suggests various satisfiers that operate across the matrix of 36 contexts/engagement pairings, and describes a number of satisfiers that are synergistic satisfiers that meet multiple contexts/engagement pairings. For instance, in the context of having (things), only the engagement of subsistence deals with material accumulations. One might have a need for symbols of belongingness, values, customs, all of which would fall into a context of having and an engagement of identity . These civic conversations are synergistic satisfiers, in the sense that they offer the experience of satisfiers over several types of engagement of interacting, (understanding , participation) as well as types of planning (doing/protection) and expressing opinions (doing/participation).

How to evaluate a Civic Conversation

Considering the power relations as described above, the question of "who evaluates" these events is worthy of consideration. Typically it is the convening organization, or agents of the convening organization who perform an evaluation of the deliberative event. More rarely, a participant or witness will write an evaluation of an event. In the course of my work I have only encountered these accounts when a participant has what could be termed a "significantly negative experience". Caitlin Luce Christiansen (2017) authored an evaluative account of the public organizational meeting of Indivisible Pittsburgh focused on a conversation that happened after the meeting ended, where two women of color (an attorney and a community activist) confronted a meeting organizer (a CMU faculty member) about the lack of inclusion of people of color in the meeting and the organizational structure of the new organization. The particulars of this account are compellingly written, and it details that significant challenge that was experienced by a number of people, a crucial lapse that was made by the organizers of the event. However, as a tool to improve participant experience from a design perspective, this account principally underscores well-understood foundational principles of constructing an inclusive dialog in a public space. An aggregate of personal accounts serves to construct one aspect of understanding of events.

This is not to say that informal or de-institutionalized evaluative accounts have lower value to the design process. An important consideration when designing to engage with communities that have experienced trauma at the hands of other groups, is centering accounts (like Christiansen's above) that question the trustworthiness of the conveners, or the convening organization. For many participants, civic conversations are not one-off events, but are perceived in the continuum of a history of acts by a political administration or other organization. The above account details a broken trust. Trustworthiness of an organization is a compelling aspect. Considering the organization by extending the idea of interpersonal trust, people come to a

civic conversation with a history of relationship, but also with some hope that positive outcomes will result from the engagement. People from groups that have experienced trauma at the hands of another group may have a deep-seated mistrust of such events. It may take concerted outreach, followed by years of successful experiences with an organization for people to begin to believe that that organization might be trustworthy. (Stalvey, 1989)

For a citizen to desire to be a part of a civic conversation and consequently attend implies the existence of three states.

Table 1 Heuristic of factors that support civic conversation

Trust (memory)	**Need**	**Hope**
Past	Present	Future

Another possible way to evaluate the civic conversation is to use the heuristic above: does the event provision for these states of a person? Does the planned experience offer an opportunity to explicate needs that the person is experiencing? Does the event as a process validate that explication by offering the potential for a positive future vision to be realized? Is the event hosted by trusted entities?

Over the three years of fieldwork I have met only a handful of people who have attended more than one meeting that I have hosted. Even those who have attended multiple meetings have an engagement with the topic, a need that is a part of their present life-moment that intersects with the topic of the meeting in some fashion. Need is one aspect (perhaps the primary aspect) that contributes to a desire to attend. While experiencing need is not enough alone to ensure that someone will attend, need is one compelling factor that drives participation, even in the light of low trust and low hope.

The more overt needs that drive attendance are typically tied to a perceived threat to one's neighborhood or business, or the potential for a perceived gain. This is known colloquially as NIMBY (Not In My BackYard) politics. But this solipsistic point of view merely replaces other politics that are inadequate to the challenge of approaching complex, systemic issues. NIMBY politics can be interpreted as a rejection of decision-making by experts (Ravetz, 1999) or as a symptom of "low resolution" within the broader system of civic feedback. (Boyer & Hill, 2013) For Boyer & Hill, NIMBYs would like green projects accomplished, but do not want to bear any of the burden of those projects, or experience any consequences. However, in spite of Boyer and Hill's characterization, NIMBY-ism should not be viewed as a problem that must be dealt with. It is important to understand that, especially for people attending a civic conversation for the first time, there exists a strong likelihood of attending because of a NIMBY-related need. NIMBY-ism, far from being a potential negative is merely one aspect of viewing an issue that will motivate a person to take action and initiate action through civic conversations. The other side of NIMBY that drives attendance at civic meetings is what I would call a "pothole mentality" is where participants think about the issue that they are passionate about (e.g. potholes on the roads that they use regularly), without considering the broader context of that project, or thinking about their needs in light of the needs of the entire street or neighborhood. Essentially though, these needs – whether they are framed positively or negatively – are what inspire someone to be involved in a civic conversation. Perceiving that the civic conversation might be a site to speak about a matter of concern means that participants are properly connecting their foregrounded, perceived needs to the opportunity to speak back into the system of government.

One important aspect of this work centers around the designer's reframing of people's conversation. When people come to a civic or public conversation bearing their matters of concern, the conversation has the potential to be a veritable potluck of matters. Through framing the process with scaffolding documents, framing the experience as a search for what neighbors need to discover about problem, the designer has the opportunity to help people organize their matters of concern, and understand them in the light of the concerns of their neighbors. Ultimately, these meetings represent the potential for opening of neighbor's worlds to other worlds through disclosive conversation. The designer is part of the process to design the physical environment, but also to shape the social and conversational environment towards inclusive discourse that evokes participants' lived experiences. Through considered research, through engagement in the network

of stakeholders that surrounds these issues, designers play an important role that isn't taken up by other actors.

Conclusions

Design and designing are acts that are inherently bound up with the creation, shaping and maintenance of society. Democratic government offers explicit and structured opportunities for participation through voting, but can also support richer engagement with people through the medium of civic conversation events. These events, in addition to providing rich data on people's situated knowledge and experience of the effects of policy, can also act as a support to and an opportunity to practice re-engagement in civic life. Through a series of successful events, designers have an opportunity build trust, surface need, foster hope, and strengthen democracy and civic life.

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'Democrazy', designing for democracy in Eastern Europe

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For design to attend to democratic endeavours it is not enough to rest on the claim that design is implicitly political, but to understand how democratisation — often in the name of political modernisation — has designed different social realities. Focusing on the 'how to' of infrastructuring for democracy has advanced a designerly politics-in-practice, and exploring political concepts in design experiments have made design more aware of the democratic conflict. Theoretical work-in-progress, this paper asks whether the concepts internalised within design literature are valid enough to think about infrastructuring for democracy in the context of Eastern Europe. We depart from the theoretical and practical difference between *design for politics* and *political design* to 1) understand how each of these concepts enable a *democracy to come* in Eastern Europe's Romania, and 2) what are the entry points for design research to understand the *democratic experience*. We explore this through a participatory intervention in Bucharest.

Keywords: infrastructuring for democracy, political design, design for politics, Eastern Europe

Introduction

Within the past decades, design has gained a rich repertoire of methods and techniques to argue for its capabilities in shaping democratic processes and democratic systems. By now there is a general shared consensus that design is both about *technical capabilities* and *ways of thinking*. It has explored democratisation by intervening, amplifying and building various movements with distinct democratic endeavours and priorities that came to be labelled under diverse design approaches such as participatory design, cooperative design, design activism or community infrastructuring to just name a few. The literature that has grown around calls to explore relations between design and democracy merges inspirations, readings and adaptations from scholarship on critical reflection *in* and *for* a democratic society, on publics coming together to address the democratic conflict, on how object-oriented politics can challenge social orders and representation, but where **infrastructuring (by design)** is an always-relational politically committed task. At the same time, there are nascent discussions on how **democracies (by design)** have played out in *the political* and *politics* of different socio-cultural settings. Theoretical work-in-progress, we are less concerned about the **'how to' of the infrastructuring for democracy**, and more focused on what it entails to **understand the democratic experience from the lens of design research.**

To attend to questions of democracy, design has been building on concepts from democratic theories and political philosophies to inform *the design object* (the material/immaterial result of designing)*, the design process* (activity, organisation, system and conduct of designing), and *the design agency* (mode of expression and the designed object as it acts on the world) (Willis, drawing on Fry, 2006). While these categories made use of the political concepts to inform the dialogue on design and democracy, they have not been studied

specifically in relation to democracy and not contextualised within different democratic experiences. The recent 'Democracy Design Platform' by Manzini and Margolin (2017) provides an opportunity for that, but it also begs for more rigorous investigation whether the conceptual arrangements borrowed work in democracies other than Western.

The call departs from the assumption that democracy is 'the condition that citizens wish to live with in a political system' but leaves it open to interpretation: "We do not have to share exactly the same idea of what democracy is: to defend it as a core value, it is enough to recognize the strong convergence between democracy and design" — a huge 'design project' that could be approached as follows:

> design of democracy - improving democratic processes and the institutions on which democracy is built; design for democracy - enabling more people to participate in the democratic process, especially through the use of technology; design in democracy - building access, openness and transparency into institutions in ways that assure equality and justice; design as democracy - the practise of participatory design so that diverse actors can shape our present and future worlds in fair and inclusive ways. (Manzini & Margolin, 2017)

The first three pillars seem to attend to the *sociotechnical dimensions of modern democracies*, while the last one suggests the *free practice of participatory design within a liberal social order*. Critics point out the open-endedness of this mission as a 'vague commitment' that positions design in support of liberal forms of democracy over alternatives (Tonkinwise, 2017). For design to respond to this challenge means to deal not only with the political principle and the structure of modern democracy but also with its sociomaterial histories and practices and their political and cultural dependences, as well as with its 'undemocratic designs' (ibid.).

For us the call means, first, a provocation to think about the *design-democracy relation* as linked with the *design-politics nexus* (Keshavarz, 2015) to challenge existing democratic frames, and consider **ways to infrastructure for democracy** **that are responsive to already produced** *democratic experiences.* In this, we approach **design as a philosophical/practical quest about democracy** that allows us to think about this relationship in terms of possibilities of **theories and praxis for *politics* and *the political*.** We ask whether the concepts internalised within design literature are valid enough to think about infrastructuring for democracy in the context of Eastern Europe. To respond to this, we first discuss the key conceptual developments within design literature in relation to the democratic theories design draws on. We then correlate this with democratisation in Eastern Europe, and sketch out an illustrative example of a design intervention in Bucharest in Romania.

Infrastructuring for Democracy by Means of *Politics* and *the Political*

Learning-by-doing has made design more aware of the democratic conflict[1] that is a shared concern as well as a polarising debate in democratic theories. Participatory Design (PD) has been exploring a mutual learning between **participatory democracy** and **radical democracy** by combining concepts from both theories in 'democratic experiments (in the small)'. These explorations have found conceptual guidance from various strands of the socio-technical, systems development, action research tradition and sociomateriality, as well as pragmatist philosophy. They supported PD to theorise *designing (for) politics-in-practice* from the perspective of *participation* and *representational collaborative practices*.

As PD increasingly engaged with the public sector, scholars made use of Chantal Mouffe's agonistic democracy to frame the sociomaterial struggle for hegemony of the publics that come together to articulate and address issues, and their consequences (Björgvinsson, Ehn & Hillgren, 2012ab; CAL Dantec & DiSalvo, 2013). Here, the Deweyan public and Mouffean agonism are combined to enable infrastructuring for democracy through *participation in design Things* and *strategies of infrastructuring*. In this, design must consider the rights and world of nonhumans too, if it is to restore a liveable human-nature relation and address ecological democracy (White, 2018). By doing the work of agonism PD practices such as *thinging, infrastructuring* and *commoning*

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[1] Mainstream thinking about the democratic conflict focuses on reaching consensus in conflicts that entail decisions about ways of ordering and organising human existence in a society. While pragmatist approaches tend to rely on human capabilities generating aims and methods to solve problems for public interests (e.g. Dewey, 2012), radical theorists stress to recognise the conflicts and division inherent in politics, their irreconcilability and the antagonistic nature of social relations that emerges from the practice of political, symbolic regimes of the social (Mouffe, 2015; Rancière, 2014).

have tried to address the key questions that radical democracy, according to critics, has struggled to address: that of institutionalisation and institutional change (Lotado & DiSalvo, 2018). But as acknowledged by design scholars too, it is becoming increasingly insufficient to only design processes for participation (Tonkinwise, 2017; Bardzell, 2018; Bannon et al, 2018) that diversify adversaries through agonism to eventually challenge the status quo, or to examine the political potential of nonhumans in politics in order to democratise sociotechnical practices (Marres, 2013; Bardzell, 2018).

Infrastructuring[2], conceived as a strategy, practice and analytical lens, has enabled PD to think beyond the temporal and spatial event of a designed project in relation to democracy (Bannon & Ehn, 2012). However, scaling up from the 'democratic experiments in the small' continues to be a struggle. Furthermore, within PD's rich practice-based explorations there continues to be a productive tension between infrastructuring as perceived within design literature and political concepts rooted within deconstruction. This becomes even more relevant when considering *infrastructuring for a 'pluralist democracy to come'* and address questions of inequality beyond the liberal democratic context. While radical democrats, such as Mouffe and Laclau, Rancière and Wolin, draw attention to the weakened preconditions for participatory democracy and deconstruct institutional critique, participatory democracy of Carole Pateman has been concerned with empowerment, citizen participation, and has developed tools for institutional change and institutionalising participatory forms to sustain democracy (Vick, 2015). While radical democratic thought sees disagreement inherent within democratic politics via the concept of agonism, participatory democracy is focused on decision-making and designing the conditions where participation can happen. Both theories have much to teach design, just as design can contribute to articulate forms, shift action and make concepts work in practice. Thinking about infrastructuring for democracy, design might benefit not only from understanding how different democratic theories have treated participation but also how democratisation projects have carried out infrastructure(ing), and how, within those infrastructures, social movements mobilised participation for democratic ideals (Della Porta, 2011).

Focusing on '**how to' infrastructure for democracy** has equipped design with a variety of tools and repertoires. But in order for these to work *in* and *for* distinct social realities, it is important to understand the **democratic experience**. In this, the conceptual and practical difference between design for politics and political design, as differentiated by DiSalvo (2010) based on the Mouffean distinction between politics and the political (2005), is highly relevant. Drawing on Derrida's approach of the democracy 'to come' and a Wittgensteinian practice-based approach to political rationality, Chantal Mouffe develops her view of agonistic pluralist democracy as a response to the universal-rationalist view and the deliberative approach to democracy. 'To come' seems to keep a necessary distance to grasp the tensions occurring between politics and the political, specifically to reflect on how different conceptions of democratic logics get inscribed within a given social order. For Mouffe, the political is the dimension of antagonism that can emerge from any social relation, while politics thrives to set an order and organise social conditions that are inherently political.

Accordingly, **design for politics** supports and improves the mechanisms and procedures of governance (by e.g. increasing the efficacy of voting, mobilising voters, making the government more transparent and efficient), whereas **political design** is concerned with questioning and challenging issues and conditions of existing structures (DiSalvo, 2010). By doing the work of agonism, political design's purpose is to 'create spaces of contest' through objects and processes of design that equal 'sites and means of agonistic pluralism'. These might enable investigations into different democratic experiences to formulate alternative conceptions of democracy. One objective, according to DiSalvo, is to 'identify new terms, themes and trajectories for action that sit opposite the known practices and discourses of design for politics' (2010). In terms of infrastructuring this suggests, that **both design for politics and political design constitute a set of practices of infrastructuring**. While design for politics by improving existing structures and mechanisms 'infrastructures (already) hegemonic relations', political design works to reveal and deconstruct those to then reconfigure them. Design's strength, accordingly, lies in 'giving form to a political condition' (or some aspect of it) and in 'shifting towards action'. In

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[2] *Infrastructure* has been the focus of sustained inquiry of STS, history of technology, media studies, anthropology, literary and cultural studies too. *Infrastructuring* within PD, as borrowed from information infrastructure and developed by PD scholars, refers to an 'ongoing designing' that defers some aspects of design until after the completion of a design project as a way to support the potential for redesign for unanticipated use or other unanticipated change (A.Telier 2011). It 'entangles and intertwines with the potentially controversial composition of priori infrastructures, previous design activities, along with everyday design activities in actual use such as mediation, interpretation and articulation, as well as actual design-in-use such as adaptation, appropriation, tailoring, redesign and maintenance' (Bannon & Ehn, 2012, p.57).

the case of Eastern Europe, the political condition is marked by the frustrations of post-communism and failures of previous democratisation processes. To infrastructure for democracy in Romania, for example, one must deconstruct the democratic experience, make sense of the what went wrong with previous democratisation projects and the blind alleys of the existing infrastructures. In order to be able to contest the hegemonic relations ingrained in civil society practices and revitalise democracy as a political system, political design must **identify the terms and conditions of citizens' hopes**. We next draft a brief overview of the democratic experience in Eastern Europe and reflect on a pilot for citizen's manifesto in Romania.

Democratic Experience in Eastern Europe (EEU)

Democratisation projects have been complicit in geopolitical games that made use of conceptual divisions and structural boundaries to promote their ideological self-interest, which in turn created imagined communities, such as Eastern Europeanness, and defined their **democratic experience** (Wolf, 1994). Visions for democracy in (Central) Eastern Europe have focused on testing and implementing conceptual schemes, typologies and patterns that were based on Western democracies but have failed to actually support the *transitions* in new democracies (Ágh, 1999; Roberts, 2006; Gagyi, 2015). Here, *transition* meant a linear change from the socialist realism of the 1980's to a market economy and democratic capitalism associated with wellbeing, competition and freedom projected by the Western 'open society' that would bring along all kinds of modernisation of established liberal democracies. Instead, what emerged was a 'multiform development' or 'hybrid' regime with 'new patterns of governance' (Roberts, 2006) that copied and stitched together elements that would apparently meet expectations of established democracies but missed to respond to local hopes: to identify the experience, knowledge, resources and design necessary to reach for a transition to democracy.

While international media reports have been focusing on issues of global structures and the shared crisis, such as the anti-democratic measures introduced in Hungary and ongoing anti-corruption movements in Romania — both concerns of the European Union project –, there continues to be nascent talk on how citizens have organised to improve their living conditions since the regime change. Understanding the socio-political context of the region from how movements mobilise for change sheds light on 'existing power-relations, political and economic blocs, symbolic fields and historically constructed political vocabularies' (Gagyi, 2015) which could inform, for instance, infrastructuring for democracy by means of political design.

In the case of Romania, **recreative activism** is put forward as a concept to explain the particularities of collective action in the region (Gubernat & Rammelt, 2017). It is also used by the scholars as a way to bridge concepts such as space, participation, leisure and classic approaches to movement studies enabling 'relational and cognitive social capital during protest participation, possibilities of online mobilization, and various forms of cultural consumption through scenes' (2017, p.145). Here, 'scenes' refer to sites that have become part of a 'lifestyle where part-time communities gather and mobilise through various engagement forms.' These part-time communities or publics emerged as result of recent movements in Romania that stood up for social (Colectiv, in 2015), political (#rezist, #totipentrujustitie, OUG13 in 2017, #farapenali 2018) and environmental justice (#rosiamontana in 2013). Along with street mobilisations, cultural producers have organised festivals that lined up debates, civic ateliers and exhibitions to contest the dysfunctionalities of the current system. Gubernat and Rammelt see the expansion of this protest culture as a 'recreative activism' that "has its roots in the concomitance of cultural consumption and non-institutionalized political participation, as well as in a certain disenchantment of protest participants with post-communist politics" (2017, p.158). Another study assigns the anger behind such mobilisations to how conditions of modern democracies — the rule of law and to suffrage — have been disabled by transnational kleptocratic networks (Chayes, 2018). Here, returning demands are not personal liberties or the act of voting but submitting the power elite to the rule of law, equal justice, and most importantly to pressure those in public office to exercise in the interest of the people. But while protesters demand adjustments in constitutional structure and its mechanisms, the government is deliberatively playing on the cultural divide and political polarization by distorting the claims and demands saying they are 'engineered by the opposition for partisan purposes' (Chayes, 2018).

Despite the growing body of documentation on creative activism part of such movements in Romania, there is no coverage of where and how *design* exists or intervenes in their changemaking activities. Departing from our research question which seeks to understand the democratic experience from the lens of design research, we set up a pilot event that invited citizens to reflect on what democracy means to them. This would inform the basis for a **citizen's design manifesto** that could work together with ongoing initiatives and movements.

'Democrazy' in Romania

The pilot event organised was hosted at the Balassi Cultural Institute in Bucharest (a diplomatic cultural institution of Hungary) as part of the 2018 Late-Night Galleries, a yearly one-night event with multiple exhibitions and talks running simultaneously across various cities. Given the recent anti-pluralist and anti-democratic waves both in Romania and in Hungary, this cultural event was an ideal platform to host a workshop that would open a discussion on the relevance of the Democracy-Design initiative in the region.

Participants were invited to create banners out of tablecloths that record messages about citizens' *imaginings*, *demands* and *actions* for democracy. These would be compiled and displayed in store fronts, (e.g. abandoned window displays) creating a communication channel to mobilise citizens within and across cities in Romania before the elections in 2020. Window displays used to have a particular aesthetic emblematic of the communist era, and even today they carry a sense of nostalgia. Following the regime change they have been taken over by brands, products and trends of Western democracies. We chose to replace the static setups of commercial design products with the banners that would depict visions for democracy. For the purpose of this event, the venue acted as a site for discussing a 'citizen's design manifesto for democracy' (Figure 2 & 3). Making use of the particularities of the space and the activity of the institute, the setup mocked old-time coffee houses where intellectuals and revolutionists used to gather to debate and plan for change. The Romanian Renaissance Brâncovenesc styled basement — a venue now hosting events organised by the Hungarian Balassi Institute — was converted into a quirky installation where citizens reflected on what is to be done about today's democracy. Five conversation tables were covered with linen and each equipped with a 'resource basket' and a series of postcards that pictured old and contemporary window displays. Participants were invited to replace goods and brands from the cards with messages about democracy. These conversation starters would then guide them into making a banner out of the tablecloth.

Figure 1 Speaker's and media corner

Figure 2 Democrazy Welcome Map (front)

Figure 3 Democrazy Welcome Map (back)

A 'speaker's & media corner' (Figure 1) had a mike for anyone wanting to share a call for action and a photo camera for e.g. shy participants to document the event. As visitors walked in, they picked up the welcome pack next to the 'weighting scale of democracy' and could join the conversation in whichever way they wanted (Figure 4). The weighing scale had messages depicting promises and values made by political parties mocking the current fragmentation of political infrastructure and confusion around ideological structures.

Visitors varied from diplomats to groups of students and designerly or artistically engaged activists. Tendency was to drop in from one event to the other happening simultaneously, so participation was relaxed. Responses from participants have been positive, but most seemed either to expect a tangible outcome from the conversation or preferred to just discuss rather than contribute to the tablecloths, or if contributing they stressed to remain anonymous. As intended, the event generated curiosity from the public based on its somewhat quirky installation (the *democrazy* window displays). While people seemed eager to discuss 'doing something about democracy', there was an underlying scepticism whether anything can be done and perhaps not specifically 'for democracy'. Among the visitors, a diplomat couple representing the Hungarian government in Romania spent around three hours reflecting and debating the topic. Another group of four people have spent time discussing about the ongoing local movements and creating a banner that pictures four pair of hands showing conflicting emotions about democracy (Figure 5). Two of the participants have been actively documenting the protests happening over the past years.

Figure 4. Venue
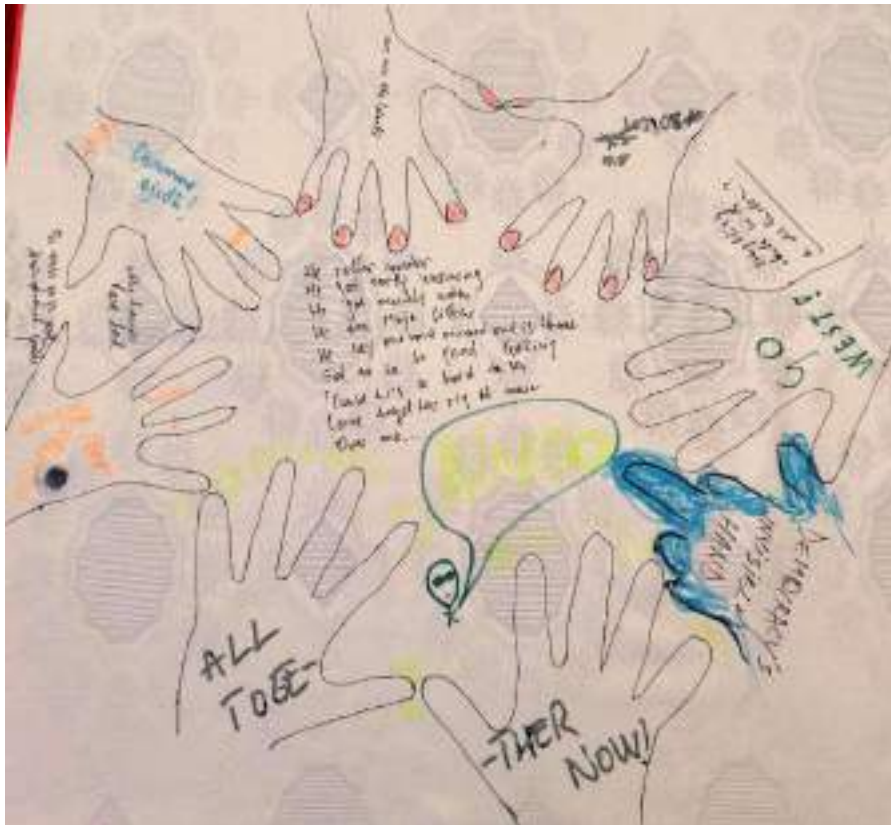
Figure 5. Citizen's Manifesto Banner

Discussion

Our pilot event confirmed a sense of urgency towards 'doing something about democracy', even though participant' responses were tinted with black humour that questioned democracy as a political system. Reflections converged on that 'democracy is not good but for now no better system has been invented'. Words such as 'demos' and 'rezist' (resistance) seemed to be key, even for the diplomat couple who showed an uneasiness about the political establishment in Hungary and Romania but also questioned the efficiency of the ongoing socio-political movements. The banner created by the four participants shows how divisive it is even to come to terms with the concept of democracy (Figure 5). It depicts four pairs of hands with conflicting messages as they join forces. One pair of hands voices 'togetherness' but with a human figure trapped in-between shouting an unclear demand. The other pair notices democracy's invisible hand backfiring the people while pointing direction Westwards. The third participant trusts in that 'we are the world' while her other hand hashtags 'boikott'. Meanwhile, the forth participant appeals to God for help as her hands are tied. Together, the banner with the four pair of hands mirrors **the paradox of reconciling with democracy**: the cry for a demos-friendly democracy and the frustrations with a hybrid regime where the political system is guided by those who distorted the very substance of democracy.

Surely the messages conveyed on the banner are symbolic and relaxed but this echoes what Gubernat and Rammelt call **recreative activism** (2017). They may provide little evidence of the democratic experience in Romania, but are illustrative of the existing scepticism towards democracy as a (universal) political system which is grounded on a systemic distrust towards decision-making practices of implementing change at a policy level. This attitude towards democracy and the welfare associated with it, also varies from generation to generation. We are tempted to say that coming to terms with the democratic experience must be addressed from an intergenerational perspective. What this means for design research, is that in order to be able to talk about a 'democracy to come' (or any future vision of democracy), political design must confront the distrust dividing the youth and the older generation. Furthermore, it must rebuild confidence in citizens' power in contributing to change through participation beyond the streets, and uniting around perspectives that can drive more collaborative strategic actions.

While the notion of recreative activism may be perceived as depoliticising by some, it has grown as part of the anti-corruption, pro-democracy and environmental movements. Despite converging on similar issues, sharing slogans and mobilisation repertoires with other global movements, these movements diverge in structural differences: when and where in time and space they are launched, and whom they directly concern (Gagyi, 2015). For the struggle for democracy, this implies that capacities, resources and conditions to organise will depend on how a given social order performs, what is set in motion that will reproduce a variant of democracy. In the case of Romania, the messages depicted on the banner **illustrate the struggle to overcome the ills of democratic transitions that have marked the political condition**. What this means for design is that in order to address democracy here, it must first deconstruct what has gone wrong with democratisation projects in the region, and make sense of structural problems vis-à-vis mainstream democratisation agendas and mechanisms. In doing this, the organisational life of local movements can provide social and participatory resources and entry points for political design to amplify citizens' demands that ask for a more honest governance.

Furthermore, recreative activism has **designed workarounds** within the same system that have become part of the infrastructure that mediates and organises the lives of its community, or as Lauren Berlant would call it, the 'lifeworld of their structures' (2016). These workarounds remain opportunistic about the principles of a capitalist welfare system. Scholars see this as a form of 'social therapy' or a way of coping with the frustrations of post-communism (Gubernat & Rammelt, 2017) and the pitfalls of infrastructures promised by democratic transition agendas. Transition approaches to democratisation have been seen as reductive, deterministic, and caught up in dichotomies not only by social movements scholars (Gagyi, 2015; Della Porta, 2011; Ágh, 1991) but also multicultural citizenship scholars (Kymlicka & Opalski, 2001) and foreign policy experts (Carothers, 2002; Carothers & Young, 2017). By focusing on a linear path of regime change and speaking the terms of international politics, it has dismissed the dimension of the political and by this, eradicated symbolic alternatives (Valantiejus, 2014). For instance, the liberal democratic category of pluralism could not make sense of the ethnocultural diversity, relations and the conflicts arising in the region after the regime change (Kymlicka & Opalski, 2001) and the political representation of minorities and politics of ethnic parties. In the case of Romania, a further complexity constitutes the representation of the Hungarian minority by the ethnic party called Democratic Alliance of Hungarians in Romania, which is also closely supported by the Hungarian government. This exists within a political landscape that has been continuously shifting between the ruling Socialist Democratic Party's oligarchs, the liberal bloc and the technocratic movements supported by international actors and the anti-corruption agency. Continuously adjusting to meet the western standards, while developing strategies to cope with austerity measures implemented by the government, has not made it easy for the ordinary citizen to open up to the pluralist holistic worldview expected of them. Nor did the interests, strategies and discourses of minority politics in the region. With tensions around globalisation and the politics of migration, soon the 'open society' came to carry not the meaning of freedom but danger and fear from the 'other' (Krastev & Holmes, 2018). In their account for the nationalistic rhetoric and the so-called 'illiberal' turn in the region, Krastev and Holmes trace this back to an ongoing, and now reversed, 'imitation game' since post-1989. This now sweeps across and beyond Europe, turning narratives and issues into 'branding opportunities' that would keep established parties and their networks on power (e.g. the anti-Soros campaign).

Looking through the lens of design, the rhetoric and materiality of the 'imitation game' is dismantling democracies by **infrastructuring (by design) for nondemocratic structures** and paving the way towards autocratic policies. In the case of Romania, for now, this looks more like **patchworking mechanisms and bargaining processes** that favour the political elite, e.g. removing judiciary systems, passing laws by night to decriminalise corrupt politicians, and releasing inmates pretending to solve the overcrowding problem of local prisons, while these threaten the safety of the public. Such thinking and practices serve (by design) the established system and keep the existing leadership on power, thus assisting what DiSalvo identifies as *design for politics*. In turn, *political design* is then concerned with mobilising to resist these forces. This consists not only of staging conversations that challenge the status quo but speculate about processes and make use of resources to provide alternatives. The pool of resources and participants within the scenes of recreative activism are already **infrastructuring pathways back to democracy by deconstructing existing conditions and contesting hegemonic relations.** For political design to formulate alternative conceptions of democracy in Romania it must **first make sense of the lived frustrations with previous democratisation processes, and the workarounds implemented by citizens to overcome a failed democratic vision and make incomplete infrastructures work**. It must also find the **political vocabulary** and **cooperative enquiry** that relates to the part-time communities already engaged within these scenes. For now, only by keeping these scenes active

scrutinisers of the established structure and dismantling mechanisms that enable corruption, could the system be reversed in favour of the citizen, and trust rebuilt in a democratic political system.

Conclusion

Attending to wicked problems has revolutionised what came to be seen design and expanded possible infrastructuring practices. But to infrastructure for democracy and make sense of democratic visions that are historically and culturally contingent, *designing for democracy* will mean to engage with the *democratic experience of a civil society*. If it is to contribute to democracies beyond Western democratic socialism, it has to understand the failures of democratic visions exported, the material, discursive and organisational practices of civil society actors, their interrelations and collective actions within the given political and economic system, and how, in a sense, design *for* politics has depoliticised the power of the people.

By drawing on concepts internalised within design literature that sustain a democratic horizon in the nexus of design-politics and by discussing them in relation to democratic theories, we asked what are the terms and conditions necessary to think about infrastructuring for democracy in Eastern Europe. Within our *Democrazy* pilot in Romania we have tried to identify through citizens' imaginings, demands and actions for democracy what could be the conceptual entry points for design to infrastructure for democracy in Romania by first understanding the democratic experience through the lens of design research. In a context, where the general understanding of design is still rooted within the consumer society that came along with democratic modernisation, and where recreative activism contests the dysfunctionality of an incomplete democracy, we staged the conversation as an invitation for a citizen's design manifesto. For political design to identify terms and shift action, to articulate the collective will and amplify political frontiers necessary to respond to local hopes of democracy, it must build on what movements have already set in motion. In the case of Romania, make use of the pool of resources and participation of the recreative scenes as well as the opportunistic mechanisms and workarounds that the community has carved out in the lifeworld structure of the civil society.

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Track 2.c Introduction: Gender of/in design practice and profession

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Introduction

Social constructionist feminist research of the last decades has shown that if we look closely enough we can see that artifacts are gendered by design. Some artifacts are gendered explicitly through their direct association with the traditional binary of women or men users; while gender is inscribed into others in more subtle ways through the normative conceptions regarding (1) their use contexts (public/private), (2) gender symbols and myths (strong/weak, rational/emotional, dirty/clean, adventurous/safe etc.) and (3) relationship with technology. This dualistic view serves as a useful strategy in design and marketing to create new segments to expand the market. Yet artifacts shaped by this view embody, represent and reproduce asymmetries in gender power relations (Kaygan, Kaygan and Demir, 2019).

These asymmetries also find form in the professional work cultures and power dynamics of design practice (Armstrong, 2012; Kaygan, 2016). Gender dynamics are both seen and unseen; played out in the everyday interactions of the design office or studio and in the public performance of the designer's role for client or public audiences (Rossi, 2009). As such, implicitly and explicitly, gender roles have the capacity to enable or inhibit the role of designer as an agent for social change.

This track seeks to open up a new avenue for feminist scholarship and trans/gender research in design innovation by exploring the relationship between design and gender and its implications for design as both practice and profession. To this end, we invited papers addressing the questions including but not exclusive to:

- What is the relationship between gender and design practice and how is this changing in contemporary design culture?
- How and to what extent can designers act as agents of change by formulating gender inequalities in terms of design problems?
- Are there any design methodologies and tools that encourage inclusive and gender-sensitive design practices?
- How can contemporary post-colonial theory and trans/gender research generate new approaches?
- What insights can gender and design histories bring to contemporary research?
- How can design educators better contribute to creating an awareness in young designers to design for a more egalitarian world for people with various gender identities?

The two articles from five authors approach the theme of this track with two different focus, being informed by different theoretical perspectives.

In *Queer-Sensible Designing*, Silas Denz and Wouter Eggink explore the ways of challenging normative gender in industrial design practice. Drawing on actor-network theory, and specifically on the concept of 'gender script', the authors devise and conduct a co-design workshop, through which they demonstrated the co-

design practice could open up the design process to non-normative gender scripts by unmasking binary gender dichotomies in industrial design.

In the second paper, *Towards the Exploration of Gender Awareness in Human-centred Design*, Bahar Khayamian Esfahani, Richard Morris and Mark Erickson demonstrates how products are gendered via product language and packaging, and their perception as gendered shapes the consumption preferences of male users. Similar to the previous paper, the authors in this paper also carry out a participatory design workshop, which is concluded by generation of design ideas.

Both papers, despite their different focuses, provide evidence for the rising interest in gender issues in design practice, particularly in the question of how can we design for non-normative and non-binary gender constructions.

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Queer-Sensible Designing: Challenging Normative Gender through an Industrial Design Practice

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Conventional design practices regard gender as a given precondition defined by femininity and masculinity. To shift these strategies to include non-heteronormative or queer users, queer theory served as a source of inspiration as well as user sensitive design techniques. As a result, a co-design workshop was developed and executed. Participants supported claims that gender scripts in designed artefacts uphold gender norms. The practice did not specify a definition of a queer design style. However, the co-design practice opened up the design process to non-normative gender scripts by unmasking binary gender dichotomies in industrial design.

Keywords: Design Practice, Gender Design, Participatory Design, Queer Theory, Gender Normativity

Introduction – Co-Constructions of Design and Gender

Despite numerous revolutionary changes in many European and North American societies, gender roles did not mitigate their power to discomfort until today. #metoo, gender pay gaps, mocking awards or homophobic crackdowns are recent symptoms of the unease with every day (hetero-)sexism. As gender studies establish as a research field, the influence of gender on engineering and industrial design processes are illustrated. At the same time, queer theory extends previous gender theories beyond the dichotomy male-female and criticises it as being of discriminatory nature. While design processes do not yet have adopted an attitude towards gender stereotypes in its discipline, post-structuralist and non-essentialist theories produced insight to the social impact of designed artefacts and the resulting responsibility of designers.

As early as in the design education, the designer's female or male gender already predefines their career orientation (Stilma, van Oost, Reinders, & Eger, 2005). Professionally designed goods also communicate design cues correlating with the designer's gender (Stilma, 2008). Accordingly, practical techniques available to industrial designers, which aim at designing for a specific gender, reproduce concepts of masculinity or femininity by defining subcategories of binary gender based on statistical data and endow them with product requirements (Stilma, 2010; Schroeder, 2010).

The aforementioned established techniques or approaches consider gender as a predefined human characteristic and do not target gender as a social construction. In contrast, the actor-network theory (ANT) from science and technology studies presents an understanding of how technology and society mutually shape each other. As a key assumption, Latour (1992) explains how designed objects or non-human actors, so called actants, serve as supporters of another actor's "program of action" and are balanced vs. their "antiprograms". A designer thus delegates their creation to serve a certain program that influences the behaviour of its user. Similarly to film scripts, which define what actors do, Akrich (1992) calls these delegations "scripts" in which

the designer inscribes their "vision of (or prediction about) the world in the technical content of the new object." (p.208).

This concept of scripting was extended to or specified on gender identities of users of technology. Van Oost (2003) describes that "gender and technology shape each other mutually" (p. 208) whereat designed objects define their users through "gender scripts". According to her, designers implicitly or explicitly make assumptions about the user's gender. Her research on Philips shavers showed that they configured the user's masculinity as technologically versed by offering additional settings and functionality, which was also expressed through the styling of the casing. Users of the Ladyshave were scripted contrarily. They were not only assumed to be female but also to have a lower affinity to technology. The shavers targeted towards female customers hid all reference to the inherent functionality underneath their round white casing. According to this model, the designers of Philips used the gender dichotomy of technology affine men vs. technologically alienated women and scripted it in the design of the different shavers.

Engineering or designing objects also unintentionally establishes gender scripts. The construction of the user is influenced by the personal context of the author and thus "gender neutral" design is said to be impossible (Brandes, 2010; Brandes, 2008)

Materialised **Morality**

Though ANT's script concept serves as an analytic tool, it cannot supply the designer with predictions, whether a user will appropriate the artefact in the scripted manner; it remains open to resistance (Ingram, Shove, & Watson, 2007).

Another point of criticism is that the ANT is rather amoral. Verbeek's (2006) theory of technological mediation extends therefore the script concept and argues that a human actor enters a relationship with a non-human actor. The newly shaped entity has experienced mediation, while the designer delegated the roles of both actors. Verbeek acknowledges that thereby society is steered technologically and ethical questions are raised. Designers are moralising technology depending on how they anticipate the mediating role of their artefact: "designers are doing 'ethics with other means'" (Verbeek, 2006, p. 369). He names already two options to anticipate mediation: by imagination and by Constructive Technology Assessment (CTA). The former is solely relying on the designers themselves while the latter is meant to "involve all relevant stakeholders" (p. 376) to shape a "democratic way to 'moralize technology.'" (p. 372).

The contradiction that established design practices construct gender, however regard it solely as a natural binary, supplies us the challenge to extend design processes beyond male and female to a conscious and responsible practice. It directly leads to the question of how a design can deliver a materialised gender that is substantially open to queer and sustainably shifts its stakeholders towards an ethical characterisation of gender or in other words: how can design sustainably shift the persons concerned to adopt ethical opinions about any forms of gender?

Materialised Normativity

The designers' role in the social (and technological) construction of gender can be concluded, that they as the protagonists in design processes are not only constructing and re-constructing products, but also gender. Their scripted artefacts are representatives for their assumptions about gender. A designer may change their claims on gender, however the product remains the same. The user's or owner's context is then deciding on the interpretation of these gender scripts and might accept or violate them; however, the artefact remains as a supporter of a particular ideology of gender. While it remains open how individuals perceive, accept and repeat these statements about their identity, queer theory can explain these dynamics and serves as a source of inspiration for a design process.

Butler (1990) describes gender as performed through repeated acts and "real only to the extent that it is performed" (p. 527). By implication, there would be no objective, natural gender or gender decoupled from social processes. It is not a user characteristic but rather an apparatus by which the normalisation into male and female occurs and defines what existence is worth living (Butler, 2002). She uses the example of Trans*-students who became victims of death threats after using their school's gendered bathrooms. This gender performativity is not described as a choice of consumerism, but rather as "the repetition of oppressive and painful gender norms" (Butler, 1992, p. 84); people cannot perform their gender by freely selecting the props

associated with masculinity or femininity. In design, Sparke (1995) identifies these gender norms in a hierarchical binary language system as in "universal values" vs. "fashionable" or "minimal form" vs. "surface ornamentation" (p. 222). She finds design terms associated with femininity are generally subordinate to their masculine counterparts.

Design seems to be subjected to these gender norms of which subversion is difficult. At the same time, people self-identify as Queer and offer an understanding of a gendered human beyond a heteronormative male or female. However, Queer itself cannot serve as *the* subversion of gender normativity and cannot refer to a particular community. The term was used pejoratively for LGBT and reclaimed by a younger generation in order to resist the "institutionalized and reformist politics sometimes signified by 'lesbian and gay'" (Butler, 1993a, p. 20). Recently the term is also expressed through the definite binarism male-female i.e. by defining it as LGBT. Especially in continental Europe, e. g. in polish mass media, Queer serves as an umbrella term for LGBT (Szulc, 2012). More open and sensitive to the various definitions is Jagose's (1996) explanation of queer being "always an identity under construction" and Sedgwick's (1994) inference "that what it takes —all it takes— to make the description "queer" a true one is the impulsion to use it in the first person".

To escape the determinism of heteronormativity and respect excluded queer individuals, practical acts have been designated as subversive to normative gender. Butler (1993b) mentions that drag could be subversive to the extent that it "disputes heterosexuality's claim on naturalness and originality" (p. 125). Very similarly, Sedgwick (1990) uses deconstructive analysis on dichotomies such as hetero-/homosexuality or male/female, describes them as already irresolvable instable and pleads to apply "material or rhetorical leverage" (p.11).

Deconstructive and Sensitive Design Methodologies

The aforementioned theories supply our work with numerous implications for a conscious and moral design practice that can be categorised in implications for stakeholders, implications for designed artefacts and implications for methodology.

About concerned stakeholders:

- Might be content with normative gender
- Might be Queer, which is true if the term is used in first person
- Gender scripts delegate how gender is performed

About designed artefacts:

- Delegate users gender role in gender scripts, e. g. manifested in the design language
- Gender is no commodity and subversion not a decision of consumerism
- existing designs script gender through the use of hierarchical dichotomies
- Gender scripts are interpreted depending on the context of the addressee
- Successful subversion of gender norms is not predictable

About methodology:

- Designers are responsible of delegating their users with scripts
- Involvement of stakeholders, i.e. by CTA, could democratise and morally justify the design process
- Deconstructive analysis enables to display and resolve gender binarisms
- "Cross dressing" may dispute heteronormativity's claim on originality

Recent design works that treat gender beyond the female/male binary exist. For instance, Ehrnberger, Räsänen and Ilstedt (2012) introduced a practical approach with emphasis on the design language. The work orients primarily on deconstruction as they interchanged the power-suggestive design language of an electric drill, as a male-targeted "tool", with the clean and tender design language of an immersion blender, as a female-targeted "kitchenware". By that, they claimed to have designed beyond social norms and one identified their graphical design language as a reference to drag.

In a different approach, queer identities are considered using unconventional design practices. Canlı (2014) argues that in design gender norms need a deconstruction or reconstruction to shift boundaries towards queer individuals. She calls this process "queering design" or later "queerying design", which Canlı (2017) applied in form of three workshop-based co-design sessions with feminists, LGBTI+ and queer activists. In her workshops, she focused on an applied generative approach to disrupt normativity in fashion, abstractly on linguistic

dichotomies with a word game and in a third workshop participants analysed and reconstructed spaces in a discussion setting.

Alternatively, the use of empirical methods to research on non-normative gender may fail, as it supports only observable categories, which are already assumed by how they are measured (Brim & Ghaziani, 2016). The addition of further categories of gender misses to open for queerness, instead these categories lead to a regulation of the intangible queer and suffer from "queer illiteracy" (Tsika, 2016). Additionally, the various contexts in which LGBTIQ terms exist prevent from practically gathering data, e. g. estimating people's homosexuality might refer to sexual behaviour, arousal, romantic affection or identity and leads to different outcomes depending on the question (Savin-Williams, 2006).

As already implied by Sedgwick (1994), a notion of queer, is then true, when it originates from those affected personally. In design processes, inclusion of personally affected stakeholders is satisfied through participatory design. Similar to Verbeek's understanding of democratically moralized designing such as CTA is context mapping, a set of participatory methods. This generative research technique, structures co-design workshops by combining several methods such as modelling toolkits or disposable cameras, and enables diverse participants to share their personal experiences and reflections (Sleeswijk Visser, Stappers, van der Lugt, & Sanders, 2005). Sleeswijk Visser et al. (2005) note about the participants that small groups (four to six) are advisable while non design practitioners may deliver less aesthetic and more personal results. Further, they present a preliminary phase to encourage participants to reflect about their personal context, the "sensitization" (p.5). Sensitisation is completed prior to the workshop but connected in terms of content and may consist of small tasks or activities e.g. prepared toolkits.

Qualitative research offers also applicable techniques such as deconstructive analysis. Translated to the materiality of product design, the design language is receptive for detailed analyses. Van Oost (2014) introduced a multidimensional matrix to analyse the relation between a product and its gender scripts. It serves to identify gender scripts implied through product design. The product design is here divided into form, function and user interface. Gender scripts are composed of three levels: gender symbolism, gender structure, and gender identities and additionally their effects on gendered users. An analysis is performed by investigating an artefact element by element and thereby completing the scheme (Table 1).

Table 1: Product Design – Gender Scripts matrix based on "Heuristic scheme for product gender script analysis" (van Oost, 2014)

Product Dimensions	Gender Script Dimensions			
	Gender Symbolism (dichotomies) e.g. control/obey	Gender Structure (Context) e.g. location (domestic/public)	Gender Identity (Personal Characteristics) e.g. daredevil	Effect on Gender e.g. perpetuating gender stereotypes
Form (Design Language) e.g. symbols on identities	…	…	…	…
Function e.g. gendered activities	…	…	…	…
User Interface e. g. presupposed competences	…	…	…	…

A different model, which is rather focused on the design language and serves to identify the relation between explicit design language, implicit symbolism and abstract ideologies, is a framework of triangular or pyramid shape (Figure 1). Mulder-Nijkamp and Eggink (2013) originally developed the framework to translate explicit two- to three-dimensional design cues of a product portfolio to an abstract brand identity and vice versa. The abstract construct of a brand identity consists of symbols expressed through design features. Similarly, the social and technological construction of gender or rather a person's gender identity is, among others, performed through gender scripts, which are again represented by symbols and design features in a single

product. Hence, this framework can offer an alternative method to support the identification of their inherent gender scripts.
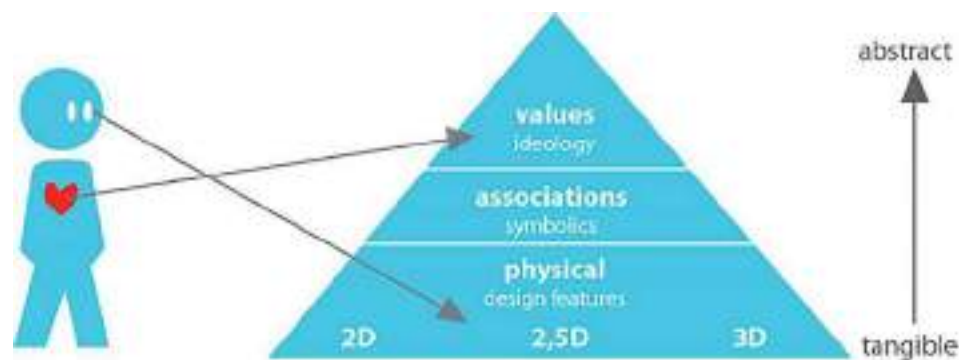
Figure 1: Adapted brand translation framework (Mulder-Nijkamp & Eggink, 2013)

Open-to-Queer Co-Design Workshop

We assume that applying empirical methods to assess Queers and their positionality to design poses a paradox or intricate application, while qualitative studies, especially those that include "queer" participants, promise to deliver intimate perspectives, preferences and suitable design features. Methodologies available to co-design are able to include identities entitled to violate gender norms. The scope of this work limits already the frame for a practice and partly predefines the resulting approach.

Firstly, the further work was limited to three main issues: (1) the real and personal impact of artefacts on queer or open to queer people, (2) the perception of gender (scripts) in objects, and (3) the personal ideas to counter possibly discomforting design. The identified challenges as well as the suitable techniques were concluded to a co-design workshop under the title "Queering Design" and the theme "bring your object". The allusion to previous work is intended as well as the temporal context generated through arranging such a study during pride month June. The resulting generative research workshop is sketched in Table 2 and elucidated more precise thereafter.

Table 2: Structured workshop scheme

Workshop Phase	Duration	Content	Material	Means of Documentation
Preliminary Organisation and Sensitisation	-	Invitation and task to select an object	-	None
Welcoming and Organisation	10 min	Workshop programme and declaration of consent	Screen, pens and printed documents	None
Information about Queer Theory and Design	20 min	Theoretical information on the subject matter, presentation	Screen	Minutes
Introduction of Actors	15 min	Making and telling introduction game with nameplates for participants and objects	Screen, paper, coloured pens, glue, scissors, screen	Minutes, photos
Discovering Gender Scripts	45 min	Fill in the blank of gender script translation framework	Screen, whiteboard, markers, post-its, pens	Minutes, photos, video
Break	15 min	Free for small talk, coffee or tea and snacks	-	Minutes
Deconstruction of Gender Scripts	60 min	Focus group discussion, making and telling	Screen, clay, Lego, trash, pens, paper, glue, scissors	Minutes, photos, videos
Wrap-up	15 min	Acknowledgement of participation and open discussion	Screen	Minutes
Total	3:00 h			

Preliminary Phase

We address with our workshop "queer" identities or those who are open minded about potential violations of heteronormative gender. The reason is self-explaining: participants who are content with essentialist claims on gender and heteronormative structures in technology are assumed to either lack motivation to participate or feel offended and probably offend or discomfort Queer participants. Potential participants were invited directly through personal requests or invitations sent via social media, messenger app and e-mail. Additionally we invited by spreading flyers. The addressees were LGBTIQ activists, members of "LGBT+" associations, Industrial Design Engineering students, friends and acquaintances, however everyone who was interested and open minded about the topic was welcome to participate.

These invitations (Figure 2) urged the potential participants to reply and sign up for the workshop in order to receive further information, while it remained open to anybody who could relate to the issue. This enabled also to communicate changed details of the workshop such as time and location.

The procedure started even before the gathering for the workshop. Preliminary, participants were asked to decide on an object they would like to bring. Since this task serves as a "sensitisation", we offered implicit suggestions on possible items, in order to stimulate a personal reflection about the objects shaping their life.

However, not actually part of the practice, the eight participants were asked to sign a declaration of consent, that photos and videos can be taken and anonymised photos are allowed to be used for reporting the session.

One participant did not fill in their name and another one signed with a name other than known to the group. Further, the participants were instructed that their attendance was voluntary; they were free to interrupt at any time. To make the group feel experienced enough to participate in the workshop, they were told that their knowledge and attitudes would be all correct, as the facilitator is not omniscient. Since we did not expect participants with racist, Anti-Semitic or other group-focused enmity, we were able to express this statement without risks.

Figure 2: Invitation poster and flyer for the workshop

Information about Queer Theory and Design

All with different socio-cultural backgrounds, participants were introduced to the subject matter in a condensed presentation of gendered design processes (Figure 3) and the concept of Butler's gender performativity as a mediator of queer theory. Participants were encouraged to understand how the repetitive acts of gender performativity upholds the normative binary of gender. On that account, participants should be able to open up to a more diverse understanding of gender than male and female and grasp it rather as an apparatus by which the normalization occurs (

Figure 4).

Figure 3: Simplified gendered design process
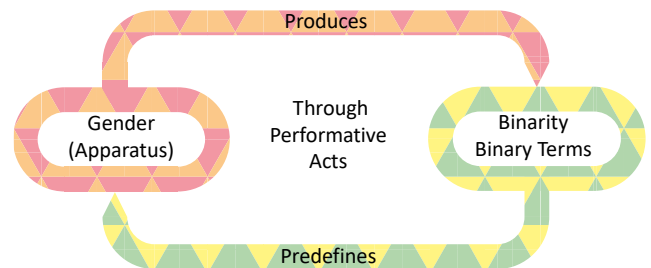
Figure 4: Repetitive performative acts constructing gender

In an example, the role of industrial design was illustrated with product pictures of obvious gender scripts in products, i.e. their graphic language. Further, the concept of ANT was introduced by calling these objects actors, which perform gender.

Introduction of Actors

Though the participants were made familiar with the social construction of gender, the facilitator did not answer what queer could be in an oppressive binary gender system. Instead, the participants were intended to present themselves and their objects with the help of self-made nameplates (Figure 5). Nameplates were crafted mostly without extra features but only with text. All participants used their real names and gave descriptive names to the objects they brought. By introducing themselves and objects, the participants explained the reasons why they attended the workshop and why they chose the objects they brought.

Participants attended mainly because of personal interest about "gender in objects" and "mad" normative gender roles, or interest in queer theory and politics. The objects were heart-shaped sunglasses, a "man's" perfume, a clip on lens for smartphones, a Casio watch, a pink chapstick, a "Dopper" bottle, a novel and a smartphone protective case.

Most participants had an intimate story about the object such as that their mum bought it for them (perfume and chapstick) or that it gives them "self-confidence" (heart-shaped sunglasses). For the participant who brought the "male's" perfume, the relation became even more intimate since the perfume was bought while the participant identified as male, however now identifies as female and still wears the perfume. The participants who brought the book and the bottle regarded them as "gender neutral" objects.

Participants thought differently about the term queer and barely used it for themselves. One participant explained that she understands it as an "umbrella term" for LGBTI and would identify as queer.
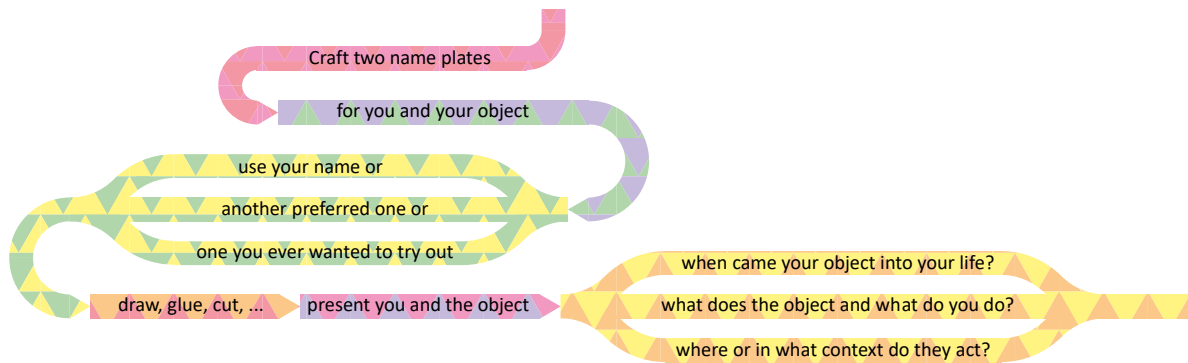
Figure 5: Guiding workflow of the introduction game

Discovering Gender Scripts

How gender is perceived and materialised is always dependent on context. With the help of the second part of the workshop, participants can express what inscribed gender roles they perceive. The gender script would then no longer be the perception of a single gendered user but a collective non-heteronormative perception of scripted gender in distinct objects. Not only the graphical design language, but also the multisensory characteristics as well as indirect knowledge e.g. from advertisements or etiquette are observed in this task

Mulder-Nijkamp's and Eggink's (2013) brand translation framework was revised to a gender script framework and drawn on a whiteboard. Participants were split up into two groups of four and asked to choose one object – or rather "non-human participant" – they would like to investigate. The separated groups selected the chapstick and the perfume and filled in the blank of the triangle from bottom to top – from explicit design language to gender scripts (Figure 6).

When the participants were stuck, the facilitator explained that the transfer of a design language cue to a gender script as the core of materialised construction of gender is implied through dichotomies. An aid to discover these biased gender dichotomies was inspired by Wittgenstein's (1967) letter to architect and interior designer Paul Engelmann: "the unspeakable is -unspeakable- already contained in the spoken". In contrast to Wittgenstein's interpretation of "the unspeakable" as "the mystical", we translated the term to the concept of gender scripts. To us, the unspeakable is an imperceptible design cue when trying to identify a gender script. Usually, only one part of a gender dichotomy is scripted into products. In order to identify gender scripts we can also focus on how an object cannot be sensed, e.g. a perfume that does not scent sweet was probably scripted to smell "male", while "female" scent is expected to be sweet. In this case, the user is unable to identify a certain dichotomy with the unknown smell, however the absence of a known design feature may identify the inscribed assumptions.
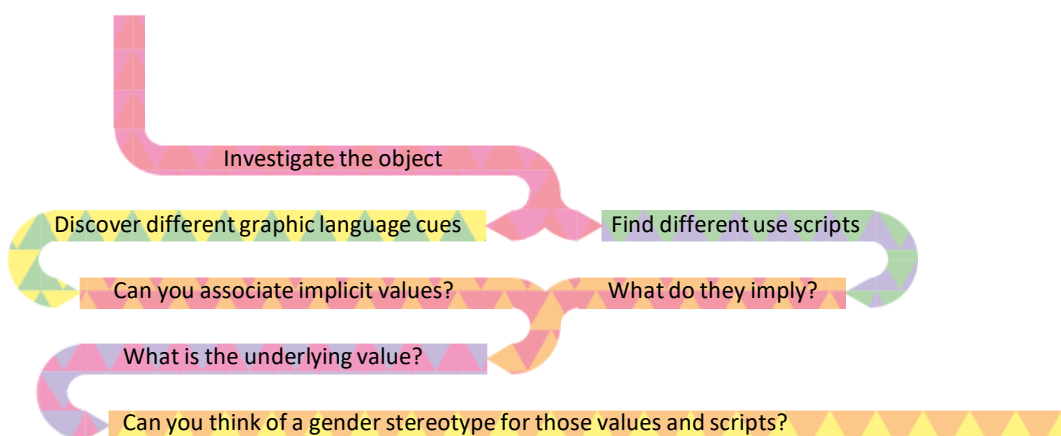
Figure 6: Guiding workflow to discover gender scripts

Figure 7: Gender script identification framework in use

The part was closed by presenting the outcomes to each other. A participant remarked that she is "annoyed by pink" while looking at the chapstick. The group found that the round shape and the pink colour are already symbols for femininity as blue marks products for boys. The shape was found to be simple "it's round, you can see it, it's pink, and not much to say there". However, more associations were made: "cute", "girly", "use it every day, I don't use it every day, but still." Also the implicit cues such as "handy", "on the go" use", "trendy" and "to feel good or beautiful" support femininity, so that the actual value was found to be "girly everywhere" (Figure 7).

The perfume was perceived as slightly more complex and also with clearer gender scripts. Participants explained that it "has a masculine scent, because it's a strong smell and it's not sweet" and it is applied "for [male users] themselves, so even when they don't go out" but that would "really depend on the person who wears it". The communicated values were presented as "from the marketing campaign, when we were googling the product". They found a corresponding product for "women" and described it as the "same product that was marketed for women, was saying it will make you irresistible". They mocked that the "female" counterpart is called "playful" which would objectify women as "pussycats". However, the presenter mentioned that she is not sure whether "it's in the object itself" because the perfume bottles had "exactly the same shape" only the "golden, pinkish" lid and tinted glass. Everybody could then decide on either being "adventurous or irresistible".

During the following informal coffee break, participants were invited for coffee and tea with cake. They used the opportunity to ask questions and express their thoughts or concerns about gendered products.

Deconstruction of Gender Scripts

Though, the critical identification of gender scripts is already an essential part in designing open to queer or non-heteronormative individuals, it is not drawing consequences for an actual change in materialised gender. Therefore, the most practical part of the workshop is set as a follow up to "Discovering Gender Scripts".

Participants are stimulated to share which gender scripts they accept and which they reject openly. In a second step, participants focus on negatively rated gender scripts and bend or reconstruct them in order to fit to other values that do not reproduce normative gender dichotomies.

The previously analysed products were still meant to serve as the object matter that undergoes a *subversion*, *queering* or *deconstruction*. The stimulation of creativity and unconventional solutions is obtained by the co-design technique of "making and telling". In "making and telling", participants ideate in small groups about the question and imagine what their idea looks like or it is used. This idea, which may serve as a scenario or script, is visualised by crafting with available material. The result itself does not serve as a usable design object but rather as a non-human assistant, which helps participants explaining their vision of a beneficial design.

In the workshop, this phase started with a group discussion on what gender scripts are most problematic. To help them expressing their ideas we offered them Plasticine, Lego, cardboard, paper, glue, pens, scissors and trash parts from old design prototypes. Second, participants were asked to find alternatives that suit their beliefs or that subvert normative gender dichotomies. Binary gender categories became thus obsolete while a new design concept was proposed. Explicitly the idea of deconstruction as applied by Ehrnberger et al. (2012) was proposed to the group: they can change the view on a gender dichotomy by adding or changing symbolism that dissolves the binarism or disputes its claim for naturalness. In a final statement, each group or each participant described their ideas on how the inherent gender scripts could be altered. With the redesigns of gendered products or deconstructed gender scripts present, instead of the original items, the group was newly configured. New materialised genders or subversions of gender were then present as actants. The final statements already gave enough input to be able to be critically discussed again.

Since the workshop dealt with subversion of social norms it was possible and desired, that participants added their own ideas on how to progress through the co-design session. Therefore, the planning needed to be open to changes and flexible to add, skip and integrate parts.

A participant mentioned that the gender script of pink as a colour for femininity, was once a colour "for boys", and left her puzzled what colour could be used now in its place. Strong dislike was also uttered about the way the female gender is (re-)constructed in the gender script of the chapstick: women are rather "preparing" their lips to be always ready to pleasure men. The status of the product would have a "structure" that makes it "necessary" for women to use the chapstick. However, "some boys would need it, but wouldn't use it" because it suggests that the product is for women only and heteronormative men would not need a chapstick.

As a solution, a participant suggested to let it look rather like a medicine product in white, to claim lip lotioning as a general human health issue. One noted that there is a wide range of lip balms available that would better suit her perception of gender or queerness. She would miss a motivation to change the object as better ones already exist. In addition, other participants were stuck and they could not think of a way to use the object further to create a subversive version from it. It was "difficult to overcome specific categories" as "maybe the product is not easy to change".

Thus, the perfume was also used as a subject matter in this part. A participant also mentioned that she would not buy it if it would violate her own gender identity. Another participant said that the name for the perfume called "playful" for "women" should definitely be changed. She offered to call the perfume "let's play" and make the bottle longer, because it seems "not connected to any category" to her.

Further, she suggested to give the perfume a number instead as "Chanel calls it N°5". Alternatively, the perfume could have no name at all and it could be described solely by a natural symbol. An attendee claimed that the scent could be more "back to basic" with a strong "not sweet" smell and the category "after shave" might be called differently. A participant took some trash parts, namely wood and chicken wire and modelled a bottle-like shape.

In the end, the owner of the perfume was arguing that the product might be marketed to "men" and therefore it might propagate stereotypes accordingly just to "sell it". "The product was given [to her] because of this stereotype", but "now that I don't want to be seen as male I would still use it just because I like it." She would like not to deconstruct her perfume "but at least just saying never mind and still doing just like questioning them". Further, a participant supported her view by mentioning that "if you want to design something adventurous and girly at the same time or maybe just girly, why not?"

Another participant's crafted object had "a lot of colours, which was showing the variety of personalities people have". By personalities, the participant also meant "genders". He stated that it came to his mind

because the group was discussing the colour of the perfume bottle. In contrast to that variety, he assumed that his book is "gender neutral". He finally concluded that the act of questioning the inherent gender scripts in artefacts was already subversive to normative gender and limited the painful repetition of gender performativity in itself.

During the discussion, the making and telling objects (Play-doh, Lego, trash, drawing material) served less as a tool of expression than to fiddle around while talking and thinking.

After the possibly intense or exhausting workshop, the participants were thanked for their attendance. Though the crafted results could not serve as usable models, we explained to the participants that the input in the discussion was already the main goal of the workshop.

Evaluation

It is possible that participants experienced discomfort or had thoughts they were not able to share publicly in the workshop group or personally with the facilitator. For that reason, a final anonymous feedback questionnaire was published online subsequent to the workshop. The previously described techniques were evaluated separately and their impact on the participants was estimated. Participants were also able to answer freely what they would like to have changed or improved.

All participants answered to remember the different parts of the workshop, however two participants did not understand the making and telling technique "Deconstruction of Gender Scripts", while the rest understood everything. In general, participants felt that they acquired new knowledge, especially about queer theory and about how gender materialises in designed artefacts. For one participant "The term "queer" isn't really defined" after the workshop.

In general, participants appreciated the different sections of the workshop and agreed with the information supplied. An explanation for that was given: "But I do believe all participants were very open minded. I can't help but think how someone who's very attached to gender norms would have reacted, which leads me to the next answer.", "I think what the gender 'norms' or 'roles' are could have been discussed more at the beginning, just to be more explicit why queer theory is handy for a lot of people!"

Since the facilitator did not particularly ask about any gender identity of the participants during the whole workshop, we asked a closure question: "Would you have liked to tell what gender you have (perform/identify with) in this questionnaire?" The question mainly serves to estimate the participants' mindsets about the importance of publicly making claims about gender after the workshop. Three would have liked to, one did not, and three found it irrelevant.

Discussion

The co-design practice aimed at enabling design processes to be queer-sensible i.e. to regard those who were excluded by normative materialisations of gender. We consequently avoided all binary gendered assumptions, such as pronouns and gender identities of the participants in correspondence. Reporting about this workshop however, we used gendered pronouns to refer to certain participants. Most participants made claims about their gender identity and accepted to be assigned to either male or female gender. In their case, an accurate use of established pronouns was possible. The notation of they, them, their or theirs can be used to refer to non-binary individuals, but neither is the term unambiguous nor is it accepted by all designated people. By using languages with grammatical gender, stakeholders obtain easily male gender scripts, when the generic masculine is used to refer to them. We suppose that this is especially the case in a professional design setting.

By asking people to bring their own object, the practice gained increased personal significance. The impact of designed products on the owner's gender could be identified effortlessly. The implications of ANT were made tangible; however, participants brought small low-cost, low-tech products, which made it difficult for the objects to be the equal of participants. The objects, in contrast to the participants, were replaceable. Furthermore, when a particular object is delegated to the participants, they might be unable to personally relate to it and do not experience how objects influence their definition of gender and even their own gender identity.

The participants, who experienced a gendered determinism of design cues, support Uta Brandes' statement that ungendered design does not exist. The participant who claimed to have brought the ungendered item, a novel, probably only referred to the concept "book", but neither to the content nor to the cover artwork nor

to the author. The gender binary apparently claims that all design cues produce either male or female implications. However, the same does not count for critical design research. The introduced practice could unmask inherent gender scripts of product design. Even though, the targeted two artefacts came from a similar domain and time, personal care products, 2018, the inscribed gender constructed the user substantially different. While the perfume scripted its user as a man who is a successful ruling businessperson, the lip balm considered their user as female, a weak pleasurer for men.

Associations to design cues are not universal and depend on the context of the audience. While some participants urged to change certain product properties, because they felt irritated, others insisted on their freedom of consumption and ability to ignore. The workshop resulted in several suggestions about how to improve designed objects. Participants urged to process rather natural than synthetic material, to avoid pink colour, to give abstract or neuter names to products, and to refer to basic human needs in place of socially constructed needs of normative gender. Some participants remained in the perspective of passively consuming goods or not. While gender cannot be regarded as an act of consumerism, it appears to be a general issue of design that potential users are defined by their ability to consume, their propensity to purchase.

The fixed perspective from consumerism further limited the generative outcome of making and telling. It made the participants experience the determinism of gender norms, as Butler already mentioned: subversion is not easy nor predictable. Introducing new symbolism may fail and establish an equally strong norm that is oppressive towards queer individuals. Besides, the use of highly participatory co-design makes the practice dependent on the participants and their current state i.e. their availability, openness, gender identity, mood, creativity and curiosity. The facilitator can mediate these effects through a carefully chaired execution of the workshop; however, the setup itself also limits the outcome. The rather short and direct treatment of the matter constrained to less creative and artistic contributions, while a higher level of gamification may lead to lower direct involvement of the participants to the problematic. Moreover, the used materials and the design of the session determine the generative outcome of the applied techniques. Dependent on the analysed design artefacts, those require adaptation.

Compared to the established design processes presented in the introduction, such as Schroeder's (2010), our practice also first analysed how users experience design objects and later on re-constructed them, however we avoided essentialist claims on gender. This reflects also in the choice of our methodology, instead of empirical studies, we applied qualitative research through participatory design. By implementing our proposed practice in alike professional environments, results that repeat essentialist normative gender might be avoided.

The practice did not cause any irritations to the gender identities of the participants. Applied techniques were mostly perceived positively, except by a few participants, who perceived the abstract step of reformulating disturbing gender scripts to introduce a new ideology of gender too theoretical and unmotivated. In subsequent utilisations, the design practice could overcome these limitations by illustrating the methods more detailed and by longer or multiple sessions. In professional settings, extrinsic motivators such as an allowance can attract participants. Future applications may be shaped around particular industrial design products and integrated into other design processes.

Conclusion

We reassigned a framework from brand design to identify those gender scripts, which are communicated through the design language. In contrast to Ehrnberger et al. (2012), it was not central to our work to recreate the design language. The participatory approach to respect queer in design or to "queer design" is similar to parts of Canlı's (2017) work, however the applied methodology and perspective is substantially different. In our work we did not strictly condition all participants to identify as queer, feminists, or LGBTI+. Further, Canlı's approach consideres many additional queerfeminist discourses such as about post-colonialism and intersectionality, while we based our work more on the explanations of the actor-network theory and in particular on (gender) scripts. Consequently the results differ in many aspects: the presented workshop in this paper is elaborating on existing industrial design products by applying analytic participatory methods, whereas Canlı's work produced tangible and abstract de/re-constructions of normative gender.

We developed a practice that focused not on finding *the* essential queer symbolism, but rather to include a queer perspective on else biased industrial design research methods. Applicable for early design research

phases, it critically identified and avoided oppressive gender norms. With our workshop, we opened the field of industrial design engineering to non-normative ideas of gender.

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Towards the exploration of Gender awareness in Human-centred design

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The primary aim of the human-centred design (HCD) approach is to identify the user needs. However, we argue that there is a lack of understanding of, and even awareness of, gender in HCD. This approach sees gender as static and stable regarding male or female such that the implication of principles in products, systems or services appeals to one gender or another linking gender differences, and stereotypes. To illustrate this, the investigation was conducted in the context of fostering sun protection behaviour in young men. Participatory design sessions were deployed to investigate the role of gender in the HCD and how it can be used to foster sun protection behaviour. We have concluded with the development of a novel gender aware HCD approach which opens avenues for design research and practice for increasing emphasis on the influence of the designer's own gender and their gendered perceptions in their designs.

Keywords: Human-centred design, gender, participatory design, sun protection, young men

Introduction

Skin cancer caused by exposure to sunlight and sunburn is the second biggest killer of young men and the most preventable cancer (Cancer Research UK, 2014). Young men, age 18 to 24 are at higher risk of developing skin cancer due to the low levels of sun protection behaviour. This is despite the growth in the market for the health promotion products produced by the cosmetics and sunscreen industries aimed to raise awareness about the risks associated with sun exposure and sunburn. This paper presents the development of strategies to foster sun protection behaviour in young men by designing new human-centred interventions.

Human-Centred design (HCD) has been applied in numerous disciplines including engineering, social platforms, business and industry, and healthcare. The HCD approach guides designers to understand human interaction on a daily basis through the psychology of human actions that impose its narrative on the field of design of objects. The primary aim of the HCD approach is aimed at understanding the users' needs and how to influence their behaviour. HCD is focused to improve the communication process and interaction between the products and the user through understanding the meanings attached while interacting with an object, and this could be improved by focusing on how the user interprets the product in terms of their gender. The lack of understanding of, and even awareness of, gender in the HCD principles were identified. So far, very little attention has been paid to the role of gender in the design of products (Moss, 2009). The aim of this paper is to explore the role of gender in the human-centred design and how it can be used to foster sun protection behaviour.

The paper proceeds as follows: Section 2 is concerned with the literature that surrounds the HCD. Also, it reviews the importance of gender and masculinity and its role in young men health-related behaviours. Further, this

section reviews the HCD approach to achieve the desired health-related behaviour. Section 3 discusses the deployed method to investigate the role of gender in HCD. Section 4 draws together the key findings emerged through participatory design sessions. Lastly, it opens suggestions for design implications and future research in the field of gender and design.

Literature review

Human-Centred Design

HCD is a creative approach to problem-solving that prioritises understanding human needs. HCD is based on the key principles of human psychology in order to develop products, services, and systems that are understandable, usable and desirable for people (Norman, 2013). Norman describes the interaction between the user and a physical object through the HCD principles such as 'affordances' and 'signifiers' (Norman, 2013, p.45). Norman defined affordances and signifiers based on the interpretation of how an object is perceivable to define the possible actions for interacting with an object based on the physical characteristics of objects such as size, shape, and colour which act as signifiers to show how users can interact with the objects. He also clarified the concept of affordances and signifiers as perceivable cues related to our interpretation and our past knowledge and experiences applied to our perception.

Objects targeted specifically at male or female audience, highlight differences based on gender stereotypes targeted at men and women (Karin et al., 2012, p.88). For example, products targeted at the female audience are using aesthetic characteristics such as soft, clean, organic shapes, and bright colours (Moss, 2009). We can see this when we look at, for example, Gillette razors targeted at the male or female audience; the way these differ in terms of shape, colour and material indicate the deployment of pre-existing stereotypes regarding gender and gendered norms. In this context, affordances and signifiers can be influenced by gendered based clues according to the designers' own preconceptions and pre-identified gender stereotypes.

While HCD accounts of design principles is based on a social psychology approach that explores human needs, this approach is based on a broad understanding of the shared values and common actions of all people as men or women but is not aware of the concept of gender as performative and relational. The HCD approach sees gender as static and stable relating male and female stereotypes to one gender or another. However, gender is performed and is multiple, dynamic, fluid and relational and is constructed in various ways over time in a particular context. But HCD links gender differences, gender inequalities and stereotypes to the products, services and brands. This contributes to the design products that are influenced by the designer's own stereotypical norms such as '*blue for boys*' and '*pink for girls*. In contrast, we can see that gender is socially constructed over time and understanding young men experience requires us to move beyond traditional, stereotypical and pre-identified gendered characteristics.

Gender

The concept of gender has been challenged and widely used as a social constructionism. Harriet Bradley, who is a sociologist and a major contributor in the field of gender studies refers to the sociological concept of gender as a lived experience and the nature of gender relations. Bradley, discusses that gender is socially constructed in contrast to the biological determinations and provides an explanation for the social patterns by men and women in society. The implication of this is that gender is based on the social understanding of people in relation to their gendered social groups (Bradley, 2013). More broadly, to understand gender we need to determine what is meant by sex and in particular sexuality. The concept of sex is biologically determined and fixed at birth. Sex explains the biological sexual orientation of a person and classifies people based on their natural biological characteristics as male or female. However, expressing sexuality is embedded in our cultures that are in relation to the person's sexual orientation and the way people represent their gender that reflects different characteristics associated with gender roles that form masculinity and femininity. According to Bradley (2013), gender is described as the cultural definitions of masculinity or femininity and the power between men and women that are not stable and fixed, but it develops over time in interaction with cultural and social values (Bradley, 2013, p.3).

According to Bradley, gender is persistent, everything from TV programs to car designs is gendered artefacts, and society and the world are gendered. Gender is described as the cultural definitions of masculinity or femininity and the power between men and women that are not stable and fixed, but it develops over time in interaction with cultural and social values (Bradley, 2013, p.3). Masculinity is the core theme of understanding

young men, defined by Connell as men's endorsement of traditional attitudes and behaviour that is socially constructed (Connell, 1987). In order to understand the concept of masculinity, we need to move on to the core concept of gender.

As a result, masculinity and femininity are constructed around specific cultural and social norms linked with gender inequalities in the society. This shows the connection between sex, gender and sexuality associated with authority, power and gender inequalities and the discourses of masculinity and femininity. Therefore, the root of masculinity and femininity is formed through the gender differences associated with the social and cultural impacts in the society related to being a male or female (Bradley, 2013, p.4). In line with the debates concerning gender by Harriet Bradley, Frosh et al. discuss the construction of gender not from the biological sense or genetically formed but as set of performative acts or actively 'doing gender' with a relational nature. Gender is culturally formed in accordance with the norms of society produced over time through our behaviours performing being a man or women. Frosh et al. describe masculinity as a dynamic process of gender or actively performing gender influenced majorly from a leading gender theorist; Judith Butler (Frosh et al.,2002, p.11). Frosh et al. acknowledge that there are multiple modes of masculinity or approved modes of 'being men' constructed by men that are socially constructed and fluid in dynamic ways and open to reconstruction in different contexts (Frosh et al.,2002, p.12). As Frosh et al. (2002, p.55) note: "masculinities are made into, and lived as, natural or essential identities". Overall, masculinity is a performative act; gender is a performance, and it changes in relation to our interactions and the environment. However, the HCD fundamental model of human action is based on a broad understanding of the shared values and common actions of all people.

Norman holds the view that despite the given variations and experience that affects individuals, fundamentally people approach the world in the same way regarding their perceptions, activities and the way they approach objects. Based on this model, human behaviour can be predictable on many occasions. However, gender is not simply external to us, but are built up and constituted over time and through interactions. This can be seen particularly in the dynamic patterns of our behaviour over time. This means that new designs transform over time in relation to particular contexts. Having identified this gap in the literature, this paper brings together the HCD approach and understanding gender performances to address the poor sun protection behaviour in young men. HCD provides guidance to explore the elements that fulfil the needs of young men through understanding the underlying meanings people attach while interacting with objects. For this purpose, the methodological approach taken in this research is an interpretive methodology to explore the underlying meaning people attach while interacting with object related to their gender.

Methods

Participatory design sessions

Participatory design sessions were deployed mainly focused on the act of participation, where the user was involved in all the stages of the HCD process and went beyond the traditional concepts of 'design for users' to 'design with users'. This study was conducted through eight participatory design sessions. A total of eight groups with four to six participants took part in this study for 120 minutes. In total, 23 male participants and seven female participants participated, and each session followed the same structure.

The main criteria for selecting the participants is in relation to the demographic factors including their age and gender. Since the nature of the methods including participatory design requires small groups of participants for the more focused and in-depth result, each session of the study involves direct user involvement with four to six participants. The participants were divided into two main categories including the users who are experts in the context and the subject expert demonstrated below.

The Participants will be recruited from the University of Brighton for a selection of young men and women age 18 to 24. Criteria for selecting the groups are as follows:
- User experts: male only group: male participants age between 18 and 24
- User experts: male and female in mixed-gender group: male and female participants age 18 and 24
- Subject experts: male and female experts from the fields of design, gender studies

The first stage of the study explored the participants' interpretation of products language, including the colours, shape and form. The interaction between the participants and the objects provides an opportunity to get participants thinking about product language, gender and how they interact and communicate with

objects. Also, this stage explores product language towards non-gender specific language in relation to the interpretation of the physical aspects of the products such as colours, material and shape as well as the internal meanings embedded in their interactions. In the review of the literature, the latest products targeting non-gender specific are evoked in a gender-specific language. Although, the market's shift towards gender diversity and gender-neutral products are growing in the lead brand companies such as Apple. However, the language embedded in these products are still gendered specific.

The second stage of the study was the design phase where the participants themselves designed sun protection interventions. This stage empowered the participants as designers, helping them to express their creativity, while aspects of their interactions were observed in relation to their gender. This led to innovative interventions for improving the low levels of sun protection use in young men.The co-design technique involves the user in the design process to meet their needs from their perception when the user is in full control and empowered in the sessions (Holtzblatt et al., 2005). In this technique, participants are actively involved and exposes the deep experience of participants in relation to the context through the illustration of their tacit knowledge including the hidden needs that are not fully known to the user. Tacit knowledge is subconscious, personal and known to the user but cannot be expressed explicitly in words as it is linked to skills and experiences, "knowledge that people can act upon, but cannot readily express in words." (Visser, 2009, p.4). On this basis, the user experts and the subject experts were able to communicate their tacit knowledge through the visual articulation of their ideas and needs in their designs. All the conducted sessions took place in the Creativity Centre at the University of Brighton and involved male-only groups, mixed-gender groups and an expert group. The purpose of this was to highlight the differences in group dynamics, specifically the participants' behaviour, and the enactment of their gender in relation to these different groups. The different dynamics of male-only interviews, as opposed to mixed-gender interviews, provide an opportunity to look at the group dynamics in both categories and see how this was linked with the participants' enactment of gender and masculinity.

The procedure

Phase 1: product language

Initially, the participants were introduced to a number of products, as presented in the following subsections. This phase of the study aimed to explore gender values embedded in the design of products and the ways in which they were perceived by both male and (when present in other sessions) female participants.

The investigation involved the exploration of product language in terms of 1) products targeted at both male and female genders, and 2) gender-specific products and advertisements. This phase of the study aimed to explore the interaction between the products and the participants, and the language and meanings the participants perceived. Initially, the illustrated products below (Figure 1) targeting both male and female target audience advertised as gender-neutral were presented to the participants.

The participants sat around a table while images of the product examples were presented to them. The researcher asked participants to share their opinions about the products, their motives for using the products. For the next stage of the study, a range of products (Figure 2) targeted only at the male or female audience was outlined to the participants.

Figure 1: Apple watch and Kettle and toaster by Marc Newson, Alessi's hob kettle by Michael Groves (the product photos are printed with all rights reserved)

Figure 2: Gillette razor and Bic Pen. The Dove products targeted towards women are on the left and products targeted towards men are on the right (the product photos are printed with all rights reserved)

As illustrated above, the most successful leading brands have embedded masculine or feminine attributes in their advertisements. Advertisements portray patterns that feature specific gender subjects. This includes popular gender representations focused on displaying gender differences between males and females based on stereotypes (Goffman, 1987).

The next stage of the study was an investigation of gender patterns portrayed in product advertisements aimed towards specific genders. This was the final stage of the product language phase and focused on the participants' perception of the advertisements shown in the following section. The researcher is focused on the participants' interactions and attitudes in relation to advertisements featuring human subjects linked with their own gender and masculinity. Various leading brands have embedded masculine or feminine attributes in their advertisements, with gender-specific advertisements portraying popular gender representations focused on the differences between males and females, based on stereotypes. The Dove Men+Care cosmetics advertisements featuring male subjects were discussed. As illustrated in Figure 2, the Dove brand is designed with a specific name (Dove Men+Care) and features grey coloured bottles with a bold font. This brand is very popular and successful, and its advertising campaigns are centred on using 'real' people, rather than professional models. The Dove 'Men+Care' advertisements depict ways of being a real man and promote an image of real men with real strength (Dove, 2018). This is linked to the concept of masculinity, as it portrays popular concepts associated with being a man (Frosh et al., 2002,p.17).

Key themes

The following section overviews the key themes emerged from an in-depth interpretation of the gathered data from phase one: product language. Initially, the collected data were transcribed and coded using thematic analysis in order to gain insights into identifying and analysing patterns and themes from the perspectives of the participants (Braun & Clarke, 2006).

All the conducted sessions produced a range of qualitative data including images, audio, video recordings, observation notes as texts. The collected data is discussed and analysed using an inductive approach as the data emerge new themes through the comparison of collected data in the mixed, male-only an expert group. The key findings from the analysed data suggest the expression of gender and the dominant discourses of masculinity (Connell, 2005) in commonly reoccurring patterns and themes collated are developed in connection with identifying the meanings, motivations, and experiences of the participants.

These themes portray the ways the participants seem to be concerned with 'being' like others, young men don't want to be seen as different(Mac an Ghaill, 1994). Their responses came across as their fear of being seen different as it seems they want to be accepted by being like others. The results outlined the participants' gender identity influences their perception and understanding of the appearance of products including affordances and signifiers.

Theme 1: Gendered responses and meanings

Almost all participants in the main study expressed their interest in the products which were targeted towards their own gender. In particular, they identified the main characteristics of products such as colours, shapes and materials associated with specific gender and products as targeted for either male with masculine characteristics or female with feminine characteristics. However, they recognized a range of features and meanings attached to the products as 'naturalized'. For them, these features of products are an important consideration when buying and using them targeted towards a particular gender. Many male participants feel this way and they recognised the gendered features of the products aligned with the construction of their masculinity. As the following participants explained:

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> [JS, M, 21]: *Male colours are dark blue and black, female products are curvy, and I usually buy the products that are dark colours and are for men, the font and packaging of products for men are with straight lines or as a square.*
> [EA, M, 20]: *I buy products that are dark colours and are for men, if a product is designed for women, it will have bright colours and will be soft and smells girly such as Nivea creams, flowery smells are for girls*
> [SH, M, 24]: *I always buy Gillette shaving cream that is specifically designed for men, in general, products that are designed for men look more reliable as it's guaranteed that it will do the job.*
> [EH, M, 19,]: *all the men's products are dark coloured like black and blue and women are more pink and white, if a product is for men then it's for him.*

Almost all the participants recognised products targeted at their gender through stereotypical colours such as 'pink for girls' and 'blue for boys'. This seems to be something they expect and an important consideration when they use a product. Almost all male participants avoid using products that are not designed for their gender. In some cases, this attitude was expressed repeatedly by the younger male participants aged 21 and under.

Theme 2: Masculinity

The primary motivation in choosing products by the male participants shows a link with products targeted at their gender. Here are a few examples of the way they described their unwillingness in using products that are not designed towards their gender:

> [JS, M, 21]: *I would never use female shampoos because they are smelling different to male products and I don't want to walk passing someone who thinks 'he smells like a girl'*
> [EA, M, 20]: *there shouldn't be any difference between male and female products because if it's the same product but I always buy men's products because it's important to me.*
>
> [JP, M, 20,]: *James said he won't use female products because it's very different like Lynx for men and lynx for women, they are completely different and the difference is massive*.
> [KE, M, 21]: *I won't buy the pink pen because it says Bic for her and its pink, I rather blue or transparent.*
>
> [SM, M, 20]: *there is no way I wear a feminine watch, also I don't like flowery patterns products like the blender, it's cool but I won't buy it, but I will buy it for my girlfriend.*
>
> [JP, M, 20]: *Men buy first thing it comes across to them when they want to buy something such as shampoos and they prefer something that does everything and it's less detailed and it says that it's for men so it's what they want, if it says for men so it's designed for men. The female products are very different like Lynx for men and lynx for women, they are completely different and the difference is massive, most people will think you are weird for using a female product*

The demonstrated comments refer back to the fragility of masculinity and it needs for protection (Frosh et al., 2002). However, a few male participants indicated more flexibility in using products that are not targeted towards their gender. As they explained:

> [AD, M, 22]: *I don't mind the flavour of shower gels and I usually buy the cheapest product. For example, I won't necessarily choose the boy's shaving cream as it doesn't bother me if it's marketed towards girls or products with flowery patterns.*
>
> [SH, M, 24]: *I don't mind wearing thin watches because it's cool, in fact, I'm wearing one now that is with thin straps and rounded screen. I think it looks friendlier as Stephen's watch looks rigid, not friendly, not welcoming, over the size, over the top and Hefty. I would buy pink tools if it works better as I have worked in the construction sites before and you can see the tools better because of the contrast.*
>
> [AL, M, 21]: *If there is no other pen in a shop I will buy the pink one.*

These participants explained their motivations and reasons behind their choice of objects and their openness to use products not designed specifically for their gender.

The variations in attitudes and behaviour of the male participants in comparison with the female participants indicate their gender differences created and reacted in their responses associated with displaying patterns of masculine or feminine attitude and behaviour. This is relevant in developing of understanding of the male participants' attitude and behaviour in relation to their gender characteristics and masculinity embedded in their motivations. At this point, we should note that almost all male participants expressed views and ideas associated with different versions of hegemonic masculinity. Given their social class and age, this is not surprising (Connell, 2005).

This analysis also indicated that understanding of the ways in which the male participants express their masculinity is in relation with their age as the male respondents seem concerned about their masculinity as came across as defensive and it needs the protection of the male participants' masculinity through choosing particular products.

Theme 3: Same-sex body contact

All the male participants indicated that their main worry for sun protection and applying sunscreens is regarding the application of sunscreen on their body. It is understandable from the ways they present themselves towards stereotypical gender boundaries related to the ways heteronormativity shapes their perceptions (Connell, 2005). This indicates the understanding of masculinities related to the participants fear of seen as homosexual and expression of heteronormativity through expressing their avoidance of same-sex body contact.

As they said:

> [RM, M, 21]: *I would never ask a guy to put sunscreen on my back. It is not a guy thing to do.*

> [JP, M, 20]: *I won't put sunscreens on his back and won't ask friends.*

> [SM, M, 20]: *if I go to the beach as just guys they won't put sunscreens on each other's back because it's sexual,*

> Then Stephen said 'so you think it's awkward' and then Sam said 'I didn't say it's awkward'.

> [EM, M, 22]: *I won't put sunscreen on guy friends back because people around us will judge and guys back is hairy.*

> [AH, M, 21]: *if I go on a family holiday I will use the sunscreen but when I'm with my friends and there is something awkward about using sunscreens, I am not worried about what suntan to buy but how to apply it and avoid body contact with your friends' back, something that sprays sunscreens everywhere would be good*

> [RM, M, 21]: *I would never ask a guy to put sunscreen on my back*

In response to these comments, almost all the male participants in the group agreed with their comments. However, a few of them indicated more flexibility with body tactile as outlined below:

> [SH, M, 24]: *you just say I just need to get through this awkward moment and you apply the sunscreen on someone's back.*

> [JB, M, 23]: *My girlfriend put sunscreen on my back and because I've got tattoos on my back I don't mind anyone else put sunscreens on my back.*

Although it is apparent that they still need to justify themselves and in need to protect their gender boundaries and masculinity, they show more openness and flexibility. Overall, Table 1 provides the number of participants who are in need.

Table 1: Attitudes toward same-sex body contact

Positive and negative attitude to same-sex body contact	Male Participants N=21	Female Participants N=6	All Experts participants N=3
Positive attitude to same-sex body contact	20	0	2M
Negative attitude to same-sex body contact	1	6	1F

In this case, in terms of ways in which they are in need to assert popular ways of being a man such as being heterosexual is important in the construction of their masculinity (Connell & Messerschmidt, 2005). From this analysis, fear of being seen as homosexual is one of the main reasons for the way young males present themselves towards the stereotypical ways of being like other men.

In addition, the participants also indicated various forms of asserting their masculinity such as playing rugby. Playing sports such as rugby is very popular among men and very significant in ways men construct their gendered identity and masculinity (Murray et al., 2016).

Phase 2: Design

The final phase of this study was the design phase, which was facilitated through various co-design techniques, such as ideation and brainstorming (Simonsen & Robertson, 2013). Ideation and brainstorming activities engage the participants to articulate their creativity and innovative ideas while empowering them as designers. The participants were guided through the practical activity of ideation to generate new sun protection interventions. During this stage, the participants were encouraged to ideate sun protection interventions to improve young men's sun protection behaviour. This involved them reflecting on the information from the session and applying it to new and innovative interventions.Overall the design outcomes were a range of sun protection interventions including the following categories based on the researcher's inferences: 1) Sunscreen bottles 2) Sunscreen applicators and 3) Wearable technology. The outcomes designed by each group and the participants from the discussed categories are mapped in Table 2.

Table 02: Overall design outcomes produced by each group, the number of each participant is presented numerically and indicated by their gender, Female (F) Male (M)

Main study groups	Participants (male and female)	Sunscreen Bottles	Sunscreen applicators	Wearable technology
Group 1	4M	1M	2M	1M
Group 2	3M,1F	2M,1F		
Group 3	3M,1F	1F		3M
Group 4	3M,2F	1M,2F		
Group 5	2M,2F		2F	2M
Group 6	4M	4M		
Group 7	4M	3M		
Group 8	2M,1F		1M	1M

As discussed in Section 2, affordances and signifiers are fundamentally important in understanding how an object can be used by a particular actor and is the key principle of good design (Norman, 2013). Norman defined affordances and signifiers based on the interpretation of how an object is perceivable to define the possible actions for interacting with an object. He also clarified the concept of affordances and signifiers as perceivable cues related to our interpretation and our past knowledge and experiences applied to our perception. Giacomin added the usefulness of affordances and signifiers related to the importance of

understanding the way people interact with physical objects (Giacomin, 2014). He indicated that the implication of HCD principles through a wide range of affordances in a product, system or service results in good interaction design that brings out commercial and business success.

The discussed elements pinpoint the participants' own gender reflections embedded in the design outcomes. Also, their reflections have influenced the design of the affordances and signifiers. This analysis is pushed further through a consideration of the male participants' accounts of their gender and masculinity expressed in their designs. A potential association is expected between the male participants and their designs, validating their gender and protecting their masculinity. The analysis of the design outcomes outlines a range of characteristics in the participants' design related to stereotypes, expression of gender and hegemonic masculinity. A few examples of the design outcomes are illustrated in below (Figure 3). As illustrated below, the male participants expressed their interests towards designs inked with their heteronormativity such as the sunscreen applicator in the form of a roller ball. The male participants in the expert group were also concerned with the application of sunscreen on their body and avoiding same-sex body contact. Avoiding same-sex body contact was often presented as something which usually the male participants are concerned in these outcomes. This provides evidence in the discussed material that the preferences applied in the design of affordances and signifiers towards the protection of their masculinity.

Figure 3: Examples of the design outcomes by 4 male participants on the top and 2 female participants on the bottom

The design outcomes indicated a link in the outcomes designed by the male or female participants and the reflection of their own gendered characteristics. Amongst the discussed aspects of the HCD principles, we draw out the role of gender embedded in the design of affordances and signifiers and how these elements are influenced in each design outcome. The results highlighted links with the influence of gendered characteristics in each design in relation to masculine and feminine attributes.

It is clear from the participants' comments that their behavioural patterns are asserted in relation to their challenges of being the same as others and to conform to their gender roles. As it was shown both male and female participants portrayed their perception of masculine and feminine attributes in the design of affordances and signifiers. A possible explanation for these differences is related to the participants' general preference amongst their design with an inclination towards their own gender. This goes beyond deconstructing affordances and signifiers influenced by gender roles and developed through a range of features such as lines, material, shapes, typography, colours, labels and use of details. The continues patterns of the participants' behaviour towards conforming to preconceived ideas and stereotypes is related to the ways the individuals try to conform to the normative gender roles and need various ways of showing their masculinity as the society has become more individuated.

Conclusion

The results outlined the participants' gender identity influences their perception and understanding of the appearance of products including affordances and signifiers. The reoccurring emphasis on the perceived characteristics of products targeted at the male audience showed a clear preference of male participants towards maintaining their masculine identity. Their preferences towards the appearance of popular male-targeted cosmetic products such as DOVE MEN+CARE and NIVEA MEN was an additional influence on the overall appearance of design outcomes. In addition, further explanations of their preferences were related to the product properties including chunky shapes, dark colours such as navy blue, grey and black, the appearance of silver chrome material. This suggests the deployment of their gendered tropes to understand these objects and have a gendered view of products.

In this context, affordances and signifiers guide the user to understand how to interact with an object based on the designers' gendered perceptions associated with traditionally male or female gender roles. The purpose of a gender-aware HCD is to add awareness for the influence of designers' gender perceptions in the HCD process before they are applied in the characteristic of products through affordances and signifiers. The designers' perceptions have a direct impact on how affordances and signifiers are designed and interpreted by the user which can contradict their gender identity. Male participants' perceptions of products were clearly influenced by their gender. This clearly links with the ways the HCD characteristics including affordances and signifiers were influenced by the participants' own gender. The participants' gender and masculine attributes were linked with the gendered characteristics applied in various features of the design outcomes. We saw the interplay of gender in the way affordances and signifiers were designed in these products.

This analysis guides design research towards understanding the way that gender, being a male or female designer, affects the designer's perceptions. This can suggest the way designers' gender identity play a key role in influencing affordances and signifiers which emerge in a range of physical features of a design such as lines, material, shapes, colours, and labels. The implication of adding gender awareness in the HCD approach for designers can result in addressing the gap between the world of designers and users. Bridging this gap requires designers to go beyond their gender perceptions and focus on the users' gender identities. Making the role of gender visible in designers' perceptions broadens the design of affordances and signifiers beyond the stereotypical perceptions of gender.

In addition, to foster sun protection behaviour in young men it is important to consider how gender is implied in affordances and signifiers of the sun protection products. We can facilitate this by combining HCD principles and practices with an increased and reflexive gender awareness. Doing this produces design outcomes for sun protection that are more appropriate to young men. Taking this kind of approach will move designers to consider affordances and signifiers in new and innovative ways, and this will have considerable implications in areas beyond sun protection design. The implication of GAHCD approach for designers can result in addressing the gap between the world of designers and users. Bridging this gap requires designers to go beyond their gender perceptions and focus on the users' gender identities. Making the role of gender visible in designers' perceptions broadens the design of affordances and signifiers beyond the stereotypical perceptions of gender.

Future work

This paper has opened new avenues for future research in the following direction: considering the role of a gender-aware HCD approach for the wider design community. This means to consider the implications of employing gender aware HCD in the wider design community. This would include academic design research, design education focused on HCD (product design and industrial design), and design agencies. This could include design research and practice to increase the emphasis on the importance of gender, helping to support and encourage gender-awareness in the HCD process to address user needs in their design solutions. Designers' reflections on the influence of the designer's own gender and their gendered perceptions in their designs is a starting point. This lack of gender-awareness neglects the user's needs to be addressed as it is a crucial element of how the product is established as human-centred. The whole design community should consider moving away from normative gender stereotypes when developing new designs in terms of gender identity of the user to represent fluid and dynamic gender perspectives that are socially constructed in different contexts. Our suggestion is for the Design community to avoid neglecting the designer's gender role influence and move to a closer understanding of user's interpretations of products.

Designers perceptions based on their own pre-conceptions and past experiences produces products based on their perceptions can be in conflict with the user's gender identity. Designers should avoid the influence of their perceptions based on gender stereotypes and enhance understanding of gender, the ways in which the designers can engage in GAHCD to avoid the mistakes of the previous design related to gender bias when designing new products

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Track 2.d Introduction: Power and Politics in Design for Transition

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Power and Politics in Design for Transition

This track sought to contribute to design's potential to shift, redirect and transform power relations to achieve sustainability. We sought to direct attention to the political potential in and politics of transition design with a focus on the many ways that power flows through the systems in which design operates. Our intention was to address, directly, the commentary from the DRS2018 track on Designing for Transitions, which noted that authors had tended to "stay on the safe and perhaps conventional side" of the subject. Instead, we hoped that the papers in this track would address "'politicised issues such as migration, decoloniality, the politics of climate change mitigation… and other complex and controversial problems" (Boehnert *et al.* 2018) that must be considered in planning and implementation of ongoing sustainability transitions. The politics of design transitions remains marginal in design research. With our call, we hoped to receive contributions that problematised design's current roles and conceptualised new roles for design in the context of sustainability transitions to attend to issues related to how power is and should be dealt with.

The five papers selected for this track respond to this call with an eclectic understanding of Transition Design, also known as Design for Sustainability Transitions. They reflect the broad span for design research as it starts to engage with subjects that have previously been the domain of social sciences. Ranging in scope from a systems level description of a project for the Dutch Government, to an individual's reflection of their practice as a zero-waste designer, these papers describe alternative models of expanded design practice for transitions. The authors also describe tools and methods for designers working in the area of transitions such as action research, ethnography, experience mapping, journey mapping, personas, focus group workshops, user research for the re-organisation of socio-ecological and politico-economic relationships to shift power relations, with a sustainability focus. The authors explore strategies for navigating the politics of design for sustainability transitions on a variety of scales with diverse strategies.

Sofia Bosch Gomez and Hajira Qazi presented **"The Disconnect Between Design Practice and Political Interests: The Need for a Long-Term Political Engagement as Design Practice"** which reflects on the gap between the importance that politics plays in designers' lives, and their willingness to be overtly political in their work. Bosch Gomez and Qazi view political participation by designers as having "untapped potential… to facilitate and be involved in a transition towards more inclusive and equitable socio-political systems." Arguing that designers already possess many of the skills needed to design for systems-level political change, the authors contend that "Designers' expertise lies in materializing imaginaries—bridging what we know, what the present is and what it ought to be—in order to enable new futures and possibilities." However, design for political change is clearly absent from most design programmes. To address this absence, the authors introduce a workshop framework and tool that enables design students to recognize their political agency and become comfortable with the notion of using design to influence political change.

Rebecca Anne Price's **"In Pursuit of Design-led Transitions"** describes a transition design project in the food sector run by the Dutch Government to promote sustainable daily cooking habits. Reflecting on methodological developments within design-led innovation, Price introduces 'timing' and 'velocity' as conceptual foundations for transitions, with the aim of designing to dismantle 'lock-ins' in socio-technical systems on predominantly large-scale systems. Using a S-curve model to describe growth in relation to time, Price reflects on how this informs ideas on velocity of change (gradual or abrupt). The paper includes theoretical implications of transitions analysed through the lenses of timing and velocity. As the most technocratic of the five papers, this work assumes that particular moments can be identified as "windows of opportunity" with particular velocities of transition: e.g. creative destruction, robust coexistence, illusion of resilience, robust resilience, in ways that are heavily abstracted from social and political contexts in which this project is situated. Whether or not this abstraction obscures the political complexities of particular problems with models (that might not always be as robust as we would like) is an ongoing subject for debate. Nevertheless, Price's assertion that design endeavours in the contexts of transitions should go beyond disruption, radicalism and new perspectives to focus consciously on destabilising and restabilising socio-technical systems enables reflection on the politics of these destabilising and restabilising efforts.

Also using a large-scale and systemic approach Maaike van Selm and Ingrid Mulder's paper is **"On transforming transition design: from promise to practice"** analyses and translates concepts from "Transition Design" and then proposes an integration of Transition Design with the Systemic Design Toolkit (Namahn, 2016; Vandenbroeck *et al.* 2016)). The authors aim to support the development of practice, based on the claim that few actual cases labelled Transition Design are described in academic literature. Distinguishing between what they see as three different phases – design research, design interventions and design practice for transition, they discuss opportunities for further development to address current practical challenges and limitations, pointing to potential resources and methods from fields such as strategic design. In doing so, they find the last phase to be the least developed, and especially methods for monitoring and steering to be missing. Their suggestion that there may be relevant lessons to learn from lean start-up methodology for example opens up for discussions on how to balance the urgent need to act with the need to observe and reflect.

In contrast to the systems-level perspective of the previous papers, Niki Wallace describes the first two years of her PhD exploring design against consumption in "**The Personal, political, professional: a practice in transition".** This work starts from the premise that "in order to contribute to transitions towards sustainability, both practitioners and design itself must also transition." Wallace describes (and illustrates) her own personal awakening as a process of transition. In this auto-ethnographic study Wallace details changes in her practice and perspective and introduces some of the key theoretical concepts that inform her personal, political, professional transitions. Writing about the role of the double bind in design for sustainable transitions, for example, Wallace contributes a passage worth quoting at length:

> double-bind theory stems from social psychology; it describes how schizophrenic symptoms can result from no-win situations, where complex and contradictory messages prevent action (Bateson *et al*., 1956). Designers can experience a double-bind when they view sustainability as simultaneously necessary and impossible in the context of their design brief. The resulting action paralysis can lead to design's equivalent of business-as-usual—an aesthetically pleasing range of unsustainable design outcomes. In contrast, a designer who transforms their relationships to ecology and the problems that threaten it becomes empowered to politicise their approach.

In bringing attention to the notion of the double bind in a transition design context, Wallace offers an expansion of the transition designer's conceptual vocabulary, joining other 'soft systems' concepts such as wicked problems (Rittel & Webber 1973), visual representations of systemic relationships (Boehnert 2018a, 2018b), and 'knots' (Lockton 2018) which can help designers better represent power structures, conflicts, and tensions inherent in the systems in which design operates. Working back and forth from theory to personal reflections, as pointed out by one of the anonymous reviewers, Wallace's "research stands out for its honesty and sincerity... an excellent example of incorporation of theory and practice containing both scientific rigor and artistic creativity." Although striving for a zero-waste lifestyle is not on its own an innovative or novel practice, it nonetheless relates to an important and topical transition context that can be studied at the level of the individual in sufficient depth. Wallace's account of her personal journey, thanks to its rigour and theorisation, opens up a series of rich discussion threads for designers to look into the mirror and reflect on the politics of their practice both at individual and professional-collective dimensions.

Finally, the paper **"The influence of design thinking tools on NGO accountability"** by Ledia Andrawes, Adela J McMurray and Gerda Gemser considers two case studies of the use of Design Thinking as an approach for increasing the prominence of beneficiary-centred accountability within NGOs working with humanitarian aid. With the goal of stimulating and increasing accountability, two real world projects (the first focussing on maternal, newborn and child health in Ghana, the second on humanitarian action in Lebanon) demonstrate the value of empathy felt individually by aid decision makers, as opposed to external accounts from the donor's perspective. This is powerfully reflected in a quote in the paper from an aid worker involved in the research: "I felt frustrated for them, I could see what was happening to them and it just pissed me off. It touched me, I had empathy for people who are in many ways unlike me, and in many ways just like me – it definitely increased the accountability I felt towards them." Using personas and journey maps as tools to enable those on the donor side of aid projects to understand the experience of those on the recipient side, this project brings design thinking methods to development practice and development studies with design thinking.

These papers have all contributed to emergent field of Transition Design in ways that emphasis the political dimension of change-making by design. In our view, transition design is inherently political. As an expanded conception of design, it necessarily draws on cross-disciplinary debates from ecological, feminist, post-humanist and decolonial theory to inform sociotechnical systems-oriented design practice at all scales. Where transition design advocates a design-led social transition to more sustainable futures (Irwin 2015) it has sought to do so by developing inclusive theory to enable ethical and justice-oriented design as a means to address the reproduction of social injustices by design. Moving away from traditional user-centred design to more participatory paradigms, transition design situates the user in the context of larger socio-political (Irwin *et al.* 2015; Gaziulusoy 2018; Gaziulusoy & Erdoğan Öztekin 2018) and ecological systems (Boehnert 2018c). With this perspective, transition design integrates system innovations and transitions theories, social practice theory and sustainability science (Irwin *et al.* 2015). It builds on the approaches of Design for Sustainability, Service Design and Design for Social Innovation (Irwin 2015) to enable new visions for sustainable futures (Irwin *et al.* 2015; Lockton & Candy 2018). It engages with the disciplines that describe human relationships in society and the environment such as anthropology, sociology, politics, environmental sciences, science and technology studies, etc. in ways that help designers incorporate the interests of diverse groups of people (Escobar 2018) to make more inclusive, just and sustainable worlds by design.

In conclusion, we note a distinction in design debates between those who see our current situation as a set of severe intersecting crises or even 'emergencies' (following most recently the Extinction Rebellion and a growing number of cities, councils and universities responding to the movement's call to declare 'climate emergencies' at various scales: institutional, local, regional and state level) – and those whose call to action (if there is a call to action at all) is formulated within the limitations of current politico-economic systems. Where addressing eco-social problems requires challenging currently existing values, socio-economic structures and systems, depoliticised design discourses undermine the potential for systemic design responses to the most challenging contemporary problems. This conflict between the urgency to act and the desire to continue to only slowly change design is evident spaces such as heated debates on the PhD Design List and the public statement published by the Decolonising Design Group (Ansari *et al.* 2016). Those intent on disrupting and transforming design practices responsible for reproducing unsustainable design (and the ideas that buttress these practices) continue to face political and structural obstacles as design and design research all too often remains tightly focused on insular and instrumental outcomes.

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The Disconnect Between Design Practice and Political Interests: The Need for a Long-Term Political Engagement as Design Practice

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Long-term, sustainable transitions cannot occur without working at the political level to address the serious, global political challenges we are facing today. However, the capacity of design as a rigorous component and complement of the political world is yet to be seen. In this paper we discuss surveys we conducted, showing that there is a clear discrepancy between how designers engage in the political process as citizens and as professionals. We also discuss a subsequent workshop which allowed survey participants to explore these questions of roles and agency in greater depth and offered insights into barriers and opportunities. We found the workshop to be an effective method of helping designers identify leverage points and courses to intervene within both the designer's sphere of influence and sphere of concern. In so doing, we might begin to draw more designers into the critical work of designing for a transition towards more inclusive and equitable socio-political futures.

Keywords: political participation, civic engagement, Transition Design, policy design

Introduction

Langdon Winner's oft-cited paper, "Do Artifacts Have Politics?" (Winner, 1980) is frequently used to argue that design is an inherently political act, and that our role as designers is an intrinsically political one. Yet, the presence of designers in the sphere of political and civic engagement is notably thin. Indeed, our research has shown that designers tend to view their role as active citizens as being entirely distinct from their role as designers. Though designers do engage in the political process, they struggle to reconcile that sense of political agency with their design work, and tend not to leverage their design expertise to facilitate political understanding and rapprochement through activism. The capacity of design as a rigorous component and complement of the political world is yet to be seen. Considering the designer's expertise in changing perceptions, facilitating conversations, and "imagining... new ways to live" ("Imaginaries Lab" n.d.), we view the arena of political participation as untapped potential for designers to facilitate and be involved in a transition towards more inclusive and equitable socio-political systems. Our research explores the absence of concrete political work in the realm of design and derives methods for how the design community might begin to bridge that gap.

Perhaps now more than ever, it has become imperative for designers to find ways to design interventions that foster healthy, resilient, participative and strong political constructs. One need not scroll far into a news feed to recognize that political systems all over the world are declining into increasingly volatile, precarious

structures that are nearing a tipping point towards destruction. We have already seen once-stable countries in Africa and the Middle East devolve into chaos and violence (Boghani, 2015). Now, strong Western democratic powers such as the United States and United Kingdom are also faced with rising nationalist and populist movements that threaten the very foundations of those democracies, such as Donald Trump's "America First" campaign slogan and the Brexit movement in the UK (Abbott et al., 2018).

The slow corrosion of democracy has created a sense of polarization and uncertainty on both sides. In the United States, these divisions have been kindled by a series of sociopolitical measures by the Trump administration that have consequently triggered a new wave of activism and civic awakening. An estimated 113 million voters participated during the November 2018 U.S. midterm elections, a record number in its history (Vesoulis, 2018). In addition to massive voter turnout, demonstrations have been pervasive since the recent change of government: news-making events were the Women's March in 2017 and 2018 upholding women's rights as human rights; the March for Our Lives in 2018, a demonstration in favor of gun regulation; and the March for Science 2017 in response to the skepticism from the Trump administration regarding climate change; amongst many others (Dockray, 2018). The aforementioned demonstrations all took place in the course of the past two years, some of them ranking as some of the largest protests in American history (Dockray, 2018). What is most notable from 2017 to the present is that people are rising to the challenges of our time. Regardless of the cause, it seems political participation is rampant in an age where apathy has been perceived to be the norm (Dalton, 2008).

State of Affairs

In spite of such critical shifts in politics, designers still seem to be reluctant to fully take on these challenges as part of their work. An increasing interest in political discourse gives the impression that a new field of "design for policy" is emerging/rising. We see this in universities, as service and strategic design courses are now present in the curricula of many design programs, and in the development of new programs such as Design for Government at Aalto University in Finland by Ramia Mazé (Mazé, 2017). Academic research done by Lucy Kimbell at University of the Arts London (Kimbell, 2015), Nicolás Rebolledo at the Royal College of Arts (Laboratorio de Gobierno. (n.d.)), Lara Penin at Parsons (Penin, 2018) and Christopher Le Dantec at Georgia Tech (LeDantec, 2016), amongst others, offers a new vision of how design and designers could contribute to the realm of politics and public innovation.

Beyond academia, we see the development of public sector initiatives driven by design (such as the Public Policy Lab in New York, the Lab OPM—part of the U.S. Office of Personnel Management—and the Lab@DC, both based in Washington, DC; the San Francisco Office of Civic Innovation; and the Los Angeles Innovation Team in California; amongst many others in the United States alone) ("Mapped," n.d.). Nevertheless, the explicit commitment of young designers has still been relegated to the technical and remains the interest of a minority in the design guild.

Perhaps the lack of political engagement in design work comes from the misinterpretation of two distinct terms: politics and government. In a conversation with Bryan Boyer, founder of the Helsinki Design Lab and board member of the Public Policy Lab, he referred to politics as "a vision"—the spearheading idea that stirs political decision-making in particular timeframes and negotiates a multiplicity of values and agendas.[1] Government refers to the machinery, the form in which that vision is implemented through the work of thousands of public servants and policy-makers. The need for a transition towards more sustainable futures will come hand in hand with political transitions, and these will require designers to be active political actants. By this we mean leaders of these new visions as well as practical operative implementers. We thus aim to explore the political side of the equation—how design and designers can be involved in the creation of those "visions" that nourish the governing apparatus. How might design become a pivotal instrument in the political rather than just an operative tool?

Envisioning Alternative Futures

The seriousness and expensiveness of the political climate today can be overwhelming and paralyzing for many. The sociocultural impact of politics can be considered what essayist Elaine Scarry calls "world-destroying" (Scarry, 1985, p. 29). "World-destroying" is the narrowing of a vision and of the possibilities of

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[1] Boyer, B. (2018). Personal interview with the authors.

imagination and future portrayal by the infliction of daily pain which demands present and total concentration. How can we envision the future when the present is in pain, aching, and requires our full attention and concentration?

As innovative makers, envisioning alternate futures is precisely where designers excel. Designers' expertise lies in materializing imaginaries—bridging what we know, how the present is and what it "ought to be" (Simon, 1981, p. 5)—in order to enable new futures and possibilities. This worldmaking ability is not limited to the creative, but extends to socioeconomic and cultural phenomena as well (Bodker, 1999; Docherty, 2017). Design is the conceptual and physical connector providing tools for what Scarry would refer to as "making-up"—the ability to creatively imagine alternatives to present realities—and "making-real"—materializing those alternatives (Scarry, 1985, p. 280).

Politics is also an envisioning discipline in which the need to actively create future imaginaries is essential. The contribution of design to the political sphere, then, is rather straightforward: designers have the means and possibility of creating new, abstract, speculative and hypothetical possibilities (Candy & Dunagan, 2016) and the pathways by which those possibilities could then be materialized. Moreover, because of design's malleability and permeation into everyday life, designers are uniquely positioned to have political agency and influence as well. In that sense, designers' personal vision of their work coupled with their political scope enables them to advance or deter particular agendas.

Implications for Transition Design

For this reason, politics is a critical component and powerful tool for Transition Design. Transition Design is an emerging and growing field of research that "is based upon longer-term visioning and recognition of the need for solutions rooted in new, more sustainable socioeconomic and political paradigms" (Irwin, 2015, p. 230). Transition movements argue that traditional approaches to problem solving are insufficient for our increasingly complex world of entangled, wicked problems (Irwin, 2019, p. 150), and thus new strategies will be necessary in order to transition through the precarious now to a sustainable future (Irwin, 2019, p. 149). The aforementioned global political climate—with the rise of fascism, threats to the environment, and greater marginalization of vulnerable populations—has set the stage for an even more unstable and volatile global backdrop, making the need for a transition that much more urgent but also more arduous.

Many transition movements argue that change must begin at the local level, with groups of like-minded individuals banding together to forge experimental communities rooted in transition principles such as sustainability, local cosmopolitanism, and collaboration ("What is Transition?," n.d.). Though these grassroots movements do have impact, without macro-level, large-scale policy change and the support of the political entities in which they exist, transition communities' influence remains relatively localized. A more expansive and inclusive transition towards a truly sustainable future would require policy change and buy-in from government at all scales—from local to federal. Hence, we argue that long-term, sustainable transitions cannot occur without working at the political level to address the serious, global political challenges we are facing today.

Though an oftentimes slow and arduous process, policy change is arguably the most effective means of infrastructuring change. In "Steps toward an Ecology of Infrastructure," Susan Leigh Star and Karen Ruhleder outline the "dimensions" of infrastructure, explaining that infrastructure "has reach beyond a single event or one-site practice,...links with conventions of practice," establishes standards, and is "built on an installed base," which, in the case of policy, is the system of government itself (Star & Ruhleder, 1996, p. 113). Infrastructuring, then, is the process by which isolated changes become widespread, long-lasting societal shifts.

The Multi-Level Perspective (MLP) is a theory of change that can be used to explain the process by which infrastructuring takes root. As explained by Frank W. Geels, the MLP "views transitions as non-linear processes that results from the interplay of developments at three analytical levels: niches (the locus for radical innovations), socio-technical regimes (the locus of established practices and associated rules that stabilize existing systems), and an exogenous socio-technical landscape" (Geels, 2011, p. 26). The niche is where novel ideas with the potential to shift systems first emerge (Geels, 2011, p. 27); the regime is made up of practices, beliefs, laws, and policies (Geels, 2011, pp. 26–27); and the landscape is the level of more rigid "material and spatial arrangements of cities, factories, highways, and electricity infrastructures" (Geels, 2002, p. 1260). As explained by Hargreaves, Longhurst and Seyfang, "a 'transition' is said to have occurred when there is a major

change in the way particular societal functions (e.g. energy, water, food etc.) are fulfilled or, in other words, a shift of 'regime'" (Seyfang, Longhurst, & Hargreaves, 2012, p. 5).

Transition policy will need to grant and foster flexibility between the niche and the regime, the micro and the macro without losing view of a larger political arc of detachment from the current neoliberal trend. This will be imperative to socially shift rooted political paradigms at the regime level that have precipitated the breakdown of political systems we see today. A convergent radical move is needed from niche, grassroots movements in synchronicity with top-down institutional hacking. A current ongoing example of this is New York congressional representative Alexandria Ocasio-Cortez, who began her political career as a local Bronx and Queens activist and has risen to be one of the most visible personas in Congress, with proposals such as the New Green Deal and a raise on marginal tax rates as high as 70% (Choi, 2019). With both of these bottom up and top down, significant yet opposing changes happening concurrently, there is a sense of urgency and an imperative to act to shift the balance towards values of equality, justice, and inclusivity that are the foundations of democracy. By promoting civic engagement and policy change, designers can have a direct impact at the niche and regime level and ride the momentum of these wide-spread movements to effect the long-lasting, systemic change that Transition Design seeks to achieve.

Research

Surveys

In order to understand how they can begin to create these shifts, we first needed to take a few steps back and gauge how designers currently think about political participation in relation to design. With the United States midterm elections approaching at the time of this writing and political consciousness at its height, we felt it was an ideal time to research and inquire about designers' stance: do they, either individually or through their work, participate in the political process? What are their motivations to be, or not be, involved?

We felt a general survey was the best means of obtaining a baseline understanding of how designers in a range of industries think about politics. We thus sent out two sets of surveys on October 29, 2018 and November 1st, 2018, and responses were collected up until November 5, 2018, the day before the United States midterm elections. Seeking to gain responses from a range of designers at different points in their careers, one survey was sent to all design faculty, staff, and students at Carnegie Mellon University (CMU) in the city of Pittsburgh, United States, and another, similar call to respond was shared with professional designers via the authors' personal social media accounts, triggering organic replication. Details on survey questions and responses can be found in Appendix 1.

We received 29 responses to date from faculty and students and 43 responses from professionals. Although responses to the survey for professionals came in from all over the world, this research focuses on designers in the United States, regardless of their country of citizenship. Of the 43 responses, 26 were either American citizens or non-citizens living in the United States. Questions focused on demographics (citizenship, age, political affiliation), knowledge about and interest in political and social issues, and the different ways in which respondents participate in the political process. Sixty percent of participants identified as female and 33% as male across both surveys (7% either declined to identify or identified as other). Demographics on race or ethnicity were not collected, as we were specifically interested in discovering how the participants' political agency (be that by means of their party, citizenship, or residency) influenced their approach to politics.

The vast majority of respondents from both surveys indicated that they identify most with the Democratic party, with a handful identifying with the Libertarian, Independent, Republican, or Working Families parties. When asked their level of interest in social and political issues, the majority indicated they were extremely or very interested. Notably, the level of interest did not match the expressed level of knowledge. When asked to rate their level of knowledge about the local political process and avenues for political participation, the majority of the CMU respondents indicated a 3 out of 5 on a Likert scale, with 5 indicating they were well-versed. (A little more than half the respondents who said they have little or no knowledge were either international students or non-American faculty members). Professionals were a bit more confident, with the majority rating their level of knowledge about avenues for political participation at a 4 out of 5.

In spite of the high level of interest in political issues, fairly high level of knowledge, and strong commitment to participating in the political process, very few respondents were interested in or are currently working in the public sector. Although Carnegie Mellon design students and faculty are a select population and may appear to

represent a particular predisposition, we found that their responses were echoed by professionals from all over the world. When asked, "in which industry do you hope to work when you graduate?" only three students checked the public sector as an option. 53.5% of students were interested in working for design consultancies or tech firms when they graduate, and 21% said that entrepreneurship or self-employment was an option. Similarly, of the 26 professional participants living in the United States, only four are working in the public sector, whereas 53.8 percent of respondents work either in tech or a design consultancy. Professionals were asked to what extent their work intertwines with their political views, and only two individuals responded that their politics greatly influence their work. Fifty percent stated that their work and political views are completely or mostly separate.

Workshop

Clearly, there is a discrepancy between how people engage in the political process as citizens and as professionals. Though the majority of participants indicated that politics plays an important role in their life, only a few number were inspired to carry that passion into their work. In order to understand why this was, and to incorporate a qualitative component to the quantitative surveys we had done, we designed a workshop that allowed us to explore questions of roles and agency in greater depth. The exercises aimed to understand which roles designers are most likely to enact in the context of political participation and at which points of intervention designers feel the greatest sense of agency and influence.

The workshop was held on campus at CMU. All survey respondents residing within Pittsburgh were invited to attend, including students, faculty, and working professionals. There were seven people in attendance, five of whom were current students. Participants were not actively recruited; self-motivation and interest in the topic is what sparked their participation.

First, participants were given a set of cards with different roles related to political participation written on them, such as "change perceptions," "educate and inform," or "be an activist." They were then asked to do a card sort to rank and number the roles in order from most to least important, with the option of adding their own roles or discarding whichever felt irrelevant. Next, they were given an adaptation of a mess map (Horn & Weber, 2007), in which they were asked to list potential points of intervention, ranging from where they felt they have the most influence and agency (innermost circle) to the least influence (outermost circle). We then asked participants to place the numbers of the various roles onto the map, visually connecting the roles to the points of intervention. For example, if they felt they could most easily change perceptions at the university level, they would place that role at that point of intervention on the map (Figure 1b). See Appendix 2 for step-by-step visuals of this process.

Figure 1a. Map design for the workshop for participants to place their roles within self-determined concentric areas of intervention

Figure 1b. Workshop sheet completed by a participant. Roles are ranked on the left side of the sheet, while concentric points of intervention are indicated on the right side. The numbers indicate which roles were most appropriate at which intervention point. See also Appendix 2.

Finally, participants were asked to choose a particular social or political issue that was important to them, and then design an intervention for that issue utilizing a particular role at a single intervention point. If, for example, someone indicated that gun control was important to them, and they stated that the role of "changing perceptions" was most appropriate at the university level, they would devise an intervention that can change perceptions of gun control around the university.

At the end of the workshop, we offered feedback forms for participants to remark on what they most valued from the workshop and what they would change. The feedback suggested that we needed to revise our question prompts, but also confirmed that the workshop provoked participants to recognize means of intervening that they may not have considered otherwise.

In order to reach a larger audience that could participate remotely, we converted the revised in-person workshop experience to a series of digital questions and exercises using SurveyMonkey as a tool. (See Appendix 2 for screenshots of the digital workshop). For the digital version, all survey respondents residing in the United States who were not able to attend the in-person workshop at CMU were invited to participate. To date, we have received seven responses to the digital workshop, for a total of 14 workshop participants (whether in person or remote).

Due to technical limitations, there were some challenges in translating the mapping exercise to the online survey. Nevertheless, this did not detract from the quality of responses received or insights gained for that portion of the exercise. However, relative to the digital version of the workshop, we found that participants devised more robust and detailed interventions when doing the exercise in analogue format. In person, participants were allotted 15-20 minutes to design an intervention; we conjecture that an online activity may not afford dedicating that same amount of time to the exercise.

Response

Method
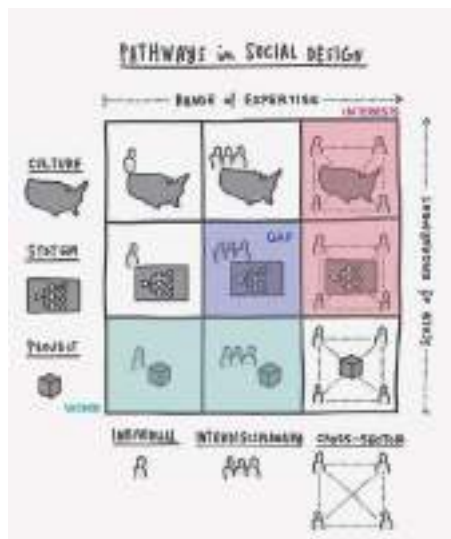
Figure 2. Adaptation of Social Design Pathways matrix developed at the 2013 Winterhouse Symposium. Source: socialdesignpathways.com

When synthesizing the responses to the surveys and workshops, we used the Social Design Pathways matrix ("About," n.d.) as a practical tool to situate the participants' area of work in contrast to their area of interest. Their work, mostly project based and most often either individual or interdisciplinary, can be situated in the lower left corner of the matrix. However, their political interests overfly systems-level cross-sectoral change in the top right of the matrix.

Based on feedback and the results of the workshop, we have found the workshop to be an effective method of helping designers begin to identify courses to intervene to begin to broach the top-right of the matrix. By having participants design an intervention for an issue of personal interest, in a role where they have some sense of agency, and in a domain where they feel they have some degree of influence, they are able to identify a point of intervention at a greater scale of engagement that is meaningful to them and has minimum barriers to entry. Moreover, they are able to leverage the skills for which they have been trained to further a cause that is of personal significance to them. Through this method, we are able to demonstrate to designers that, using their unique set of skills, they have a much greater degree of power to influence politics than they may have imagined. In so doing, we hope to inspire designers to find some ground where their work and politics may coalesce to create positive, sustainable change in our political systems.

Some may resist designers entering the realm of politics, arguing that this shift may take designers beyond the scope of their present expertise. However, we contend that designers already possess many of the skills needed to design for systems-level political change. As a point of illustration, we outline below five competencies of designers that can be leveraged across the spectrum of engagement and expertise of Social Design Pathways. For example, storytelling and communication skills used to advocate for a new app interface or to communicate to clients can just as easily apply in the political arena to advocate for policy change and communicate to representatives. We believe that building on the mastery they already have will enable designers to develop the confidence to advance their work from niche, project-level interventions to landscape-level political change.

1. Storytelling and Communication

Designers, especially those trained in visual and interaction design, are adept at storytelling and communication. As politicians are well aware, this is a powerful tool that, at its most basic level, can be used to **educate and inform** the public about issues of concern. Through that education, one begins to **change perceptions** by challenging assumptions, dismantling false narratives, and bringing awareness to issues that may be ignored or even covered up. In so doing, we can **advocate for the underrepresented**, the marginalized, and the conveniently forgotten communities that oftentimes lack but are in most need of a political voice. By doing all of the above, we can **mobilize the public** to become more civically engaged to ensure their voices are heard.

2. Facilitation

Designers of every capacity work in interdisciplinary contexts, and therefore must be able to negotiate between the oftentimes conflicting needs and demands of various individuals and teams to achieve a single, unified goal. Designers can very easily translate this skill to the realm of politics, where oftentimes divisive and polarizing views hinder progress forward. By establishing **platforms for conversation** among individuals, designers can help conflicting groups arrive at some common understanding which may then pave the way for collaboration on issues that are of shared concern. By facilitating important discussions and offering safe spaces for people to voice their concerns, designers can help **break down barriers** among groups in conflict. This is particularly needed today with the ever-expanding political divide.

3. Design legibility

Policy is an invisible infrastructure that few people understand but by which all are affected. Design plays a significant role then in changing how policy is communicated and understood by the public that it impacts. The lack of understanding of a policy often results in the public rebelling against it, even when the proposed change is in their better interest (Bosch, 2016). Design can be effective in changing people's perceptions of governments and policies by **increasing "legibility,"** that is, increasing transparency but also making policies more understandable to the general public. Increasing legibility goes one step further than transparency by making policies *understandable* so as to invite greater engagement and agency, which in turn prevents governmental abuse and ensures that policies are made in accordance with the public will.

4. Creation

What unifies designers of all backgrounds is their propensity to create something from nothing. Designers have the tools and the skill set to identify gaps in systems and create interventions that fill those gaps. Web

and interaction designers, for example, can **create digital platforms** for activists, politicians, and creatives to network, connect, and share information, which fosters an environment of dialogue, collaboration, and mutual understanding. Thus, in creating interventions, designers are **agents for change**, acting as the catalyst that materializes the type of world that people envision yet are unable to create. This is a powerful and unique skill that enables designers to have profound impact in how our political systems function.

5. Innovation

At the highest level, designers are visionaries whose ability to envision **novel ways of seeing and doing** can help society break free of destructive and toxic cycles of behavior. Designers are especially proficient at reading a complex situation and identifying several different approaches to intervening in that situation. As such, they are particularly needed in the realm of **policy-making**. Though we do not propose that designers must necessarily themselves design policy, their unique ability to find innovative solutions to complex problems would be a breath of fresh air in what is often viewed as a stuffy and stagnant political atmosphere.[2]

Areas of further exploration

Our research shows that there is a clear gap between how designers understand their civic role as individuals and as designers, and that our workshop is a promising tool that can be used to bridge that gap. The long-term impact of the workshop as a method remains to be seen. Further research would include following up with participants to understand if their motivation for political participation has been changed, exacerbated or deterred by the midterm election results and by going through the workshop.

Diversity

It would also be fruitful to engage with a more politically diverse pool of participants. As we have remarked before, most participants identified with the Democratic party; thus in order to broaden the understanding of political participation, having conservative designers partake in the series of exercises would offer insight into particular political ideologies within the design discipline, how and why designers relate to particular political discourses, or why they choose to practice design in a certain way.

As noted above, our research focused only on designers living and working in the United States. Interviewing and carrying out similar exercises with designers in other parts of the world is an area of research that we hope to explore further in order to determine whether designers in other countries are more or less active in politics, what their motivations or barriers are to doing such work, and in what ways their politics manifest themselves in their work. In so doing, we may gain additional insight into different approaches to inspire designers in the United States to become more politically engaged.

Pedagogy

Though the workshop may be an effective means of changing designers' mindsets in the short-term, we still feel that a long-term, cultural and pedagogical shift in design is needed in order to bridge the gap between where designers currently work and where their political interests lie. In a sense, a method that provides designers with the scaffolding and the confidence needed to traverse the shift between project-level interventions to systemic, political change is needed. What is still lacking is a culture in design pedagogy and industry that supports the work of designers in the realm of politics, and gateways for designers to establish fruitful careers in this arena.

In that sense, the workshop tool could be refined as an educational exercise to encourage design students to reflect upon their input—both visible and invisible, and personal as well as political—in their design work. Students in particular would benefit from it as a form of career-path decision-making or as a form of identifying inflection points of political intervention early on in their careers, such that they become comfortable with the notion of using design to influence political change.

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[2] See the example of Restaurant Day in Finland (Weijo, 2018). Although Restaurant Day may not have changed policy itself, its widespread reach and establishment as a regular festival created its own de facto policy in the country.

This can be reinforced in the classroom by encouraging a strong, confident generation of emerging designers to work intensely on wicked problems (Buchanan, 1992; Rittel & Webber, 1973) from a holistic approach. Encouraging eye-bird view approaches that are later on complemented by technical skills depending on the particular design proposal they would want to pursue. Without these, designers will continue to be able to produce and operate others' visions, but not have the potential to rally others on theirs. Preparing students early on to recognize their political agency is an essential component to creating the cultural shift in design that is needed. Educational spaces therefore become social leverage points (Meadows, n.d.) where scalable systemic approaches to complex problems are taken from early on, engaging and making students comfortable with future challenges.

Future Transition Designers will need to make radical career choices and commit to their transitional practice in an ideological way. Speaking about her particular place in government, Chisnell admits: "[...] I *never* thought I would end up here doing design and research in the federal government. I'm a career opportunist, meaning that I've always just done the next thing that looked interesting, rather than having a long-range plan" (Amatullo, Boyer, Danzico, & Shea, 2016, p. 128). This nomadic or "career opportunistic" approach to design practice is oftentimes the norm, yet makes large spatio-temporal arcs of change especially challenging. An internal reflective shift within the discipline will be crucial for designers to become the long-term standard-bearers we need.

Design Research

This research, however, just begins to broach the lacuna of research into how design intertwines with politics. Other researchers might delve deeper into how design can combat neoliberalist disillusionment with the political process, using design as a form of civil disobedience and resistance, or participation in the form of co-imagining alternative futures with the publics. We invite designers to take up these and other potent areas of research to better understand how design can play a more significant role in stabilizing our rapidly changing political structures.

Conclusion

Much like our environment, our systems of government and politics are the foundations upon which nearly all other aspects of our lives rely. Without a healthy, resilient, and robust political system that ensures the safety and wellbeing for all people, transitions to more sustainable and more equitable futures lie on precarious footing. Leveraging the expertise and competencies they already have, designers can play an important role in correcting course and working towards political systems that truly represent the voice of the people. Our research has shown that helping designers identify intervention points within both their sphere of influence and sphere of concern can help overcome initial barriers and inspire them to act on social and political issues of personal significance. Given the significance and urgency of this work, an active pedagogical push to prepare and equip designers to design for political change is called for. With more designers beginning to take on this important work, we may begin to see a transition not just within the field of design, but within the world as well.

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Appendix 1: SURVEY

Conducted via Google Forms
Practitioners: 43 respondents
Carnegie Mellon School of Design: 29 respondents
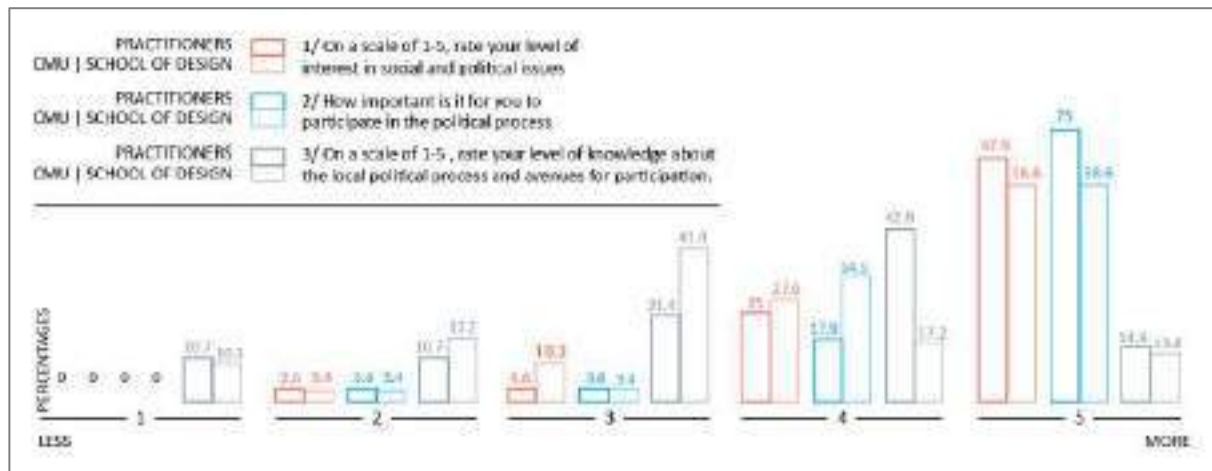
Figure 1: Responses from practitioners and students. Comparison of the importance given by participants to social and political issues, to their participation in the political process, and their knowledge on the local process and avenues of participation.
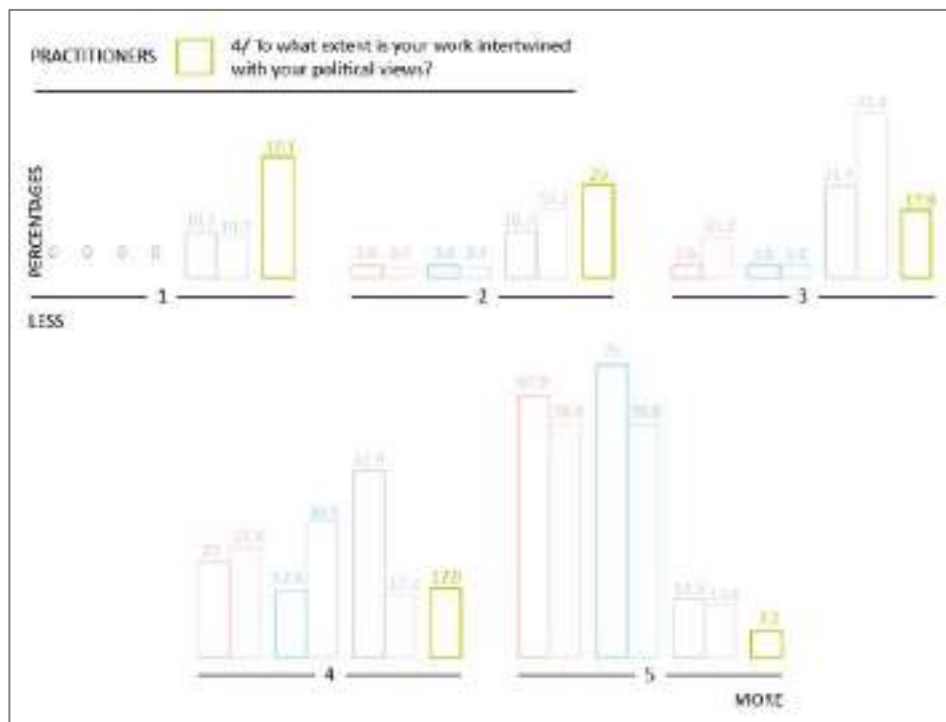
Figure 2: Comparison between responses to questions 1,2 and 3, and the extent to which participants viewed their work intertwined with their political views.
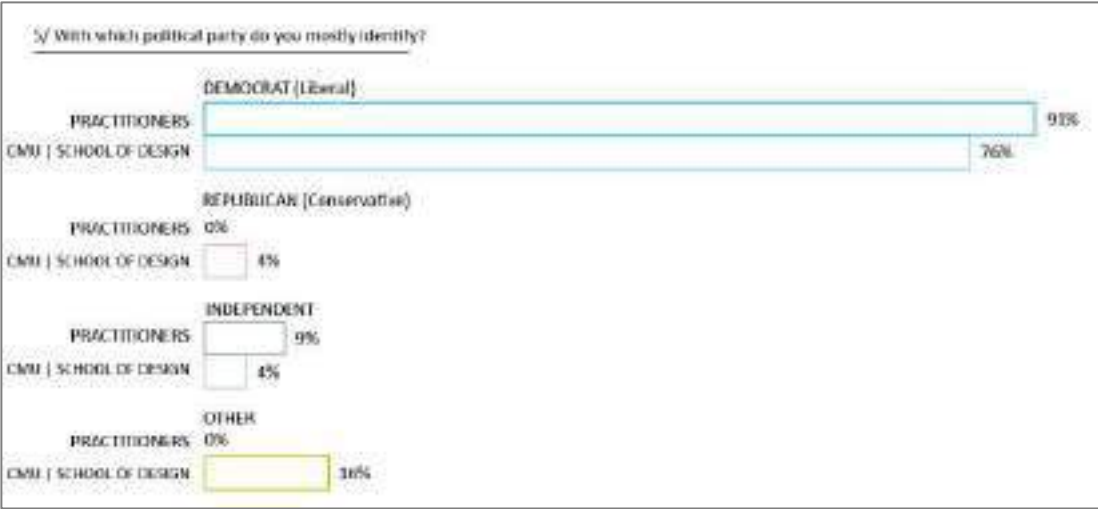
Figure 3: Political Party participants identified with.
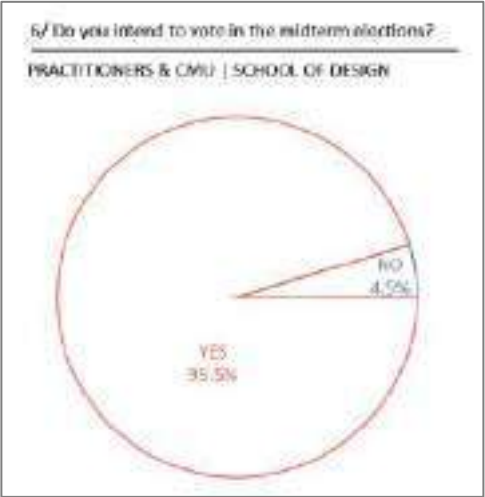
Figure 4: Intention of participants to vote on the midterm election.
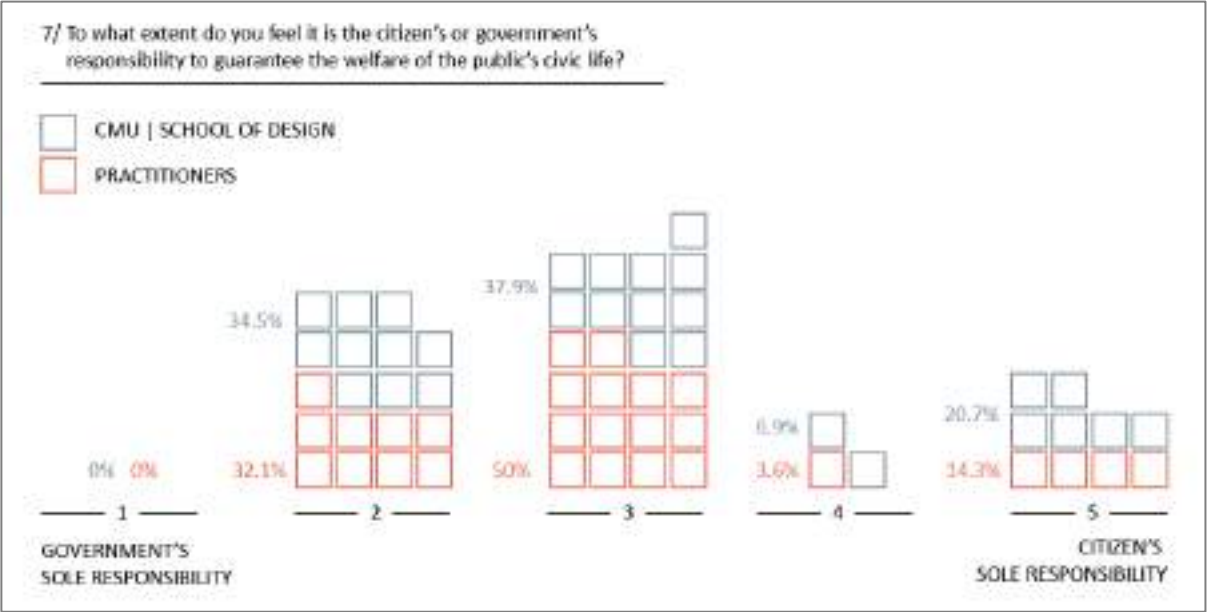
Figure 5: Participants intake on government versus citizen responsibility on the welfare of civic life.
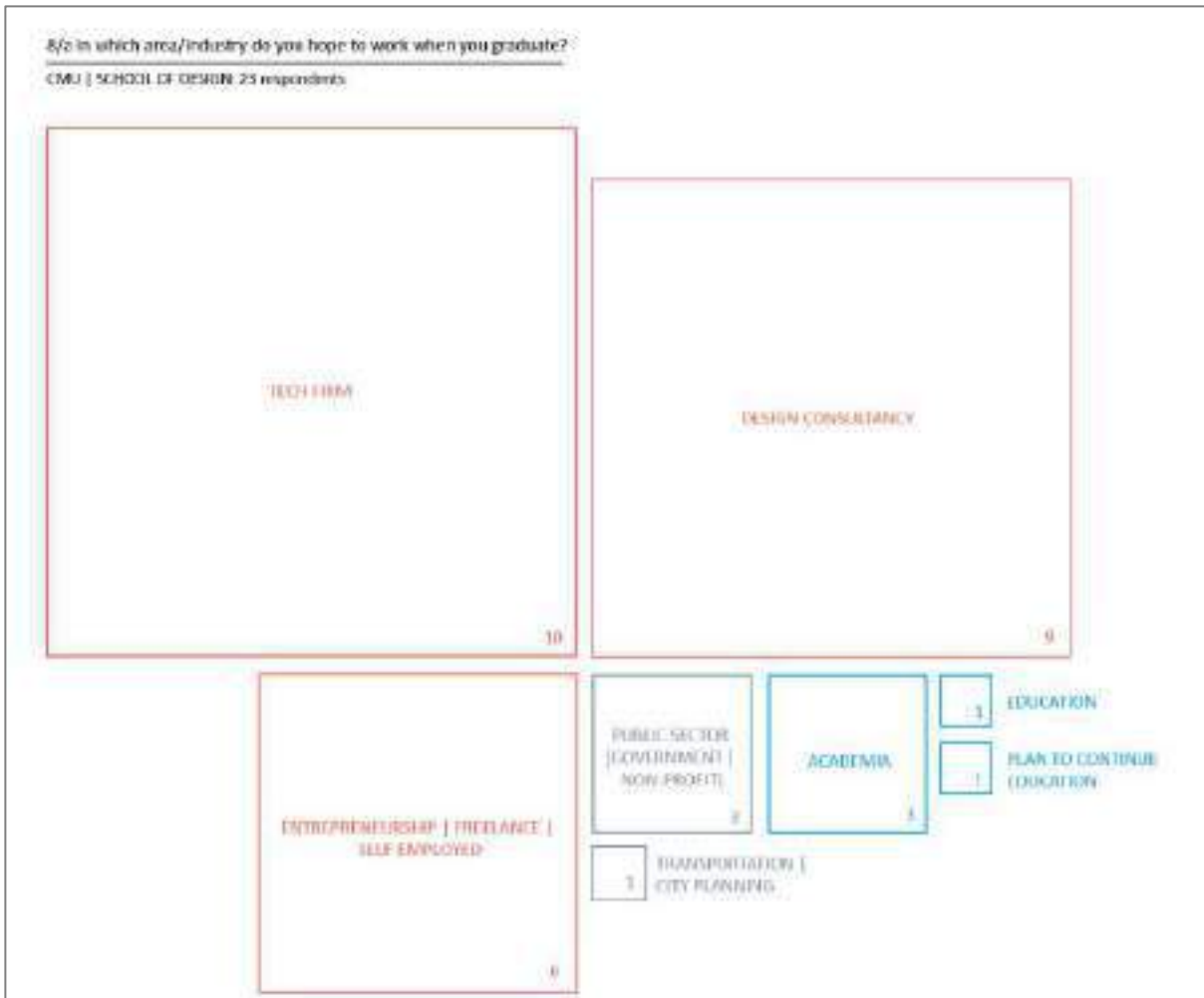
Figure 6: Industry in which students responding to the survey wish to develop a career after graduation.

DESIGN CONSULTANCY

TECH FIRM

13

CORPORATION

2

15

IN HOUSE ART DEPARTMENT 1   STARTUP / ARTISTIC INCUBATOR 3

AD AGENCY 1

PUBLIC SECTOR [GOVERNMENT | NON-PROFIT]

2

ENTREPRENEURSHIP | FREELANCE | SELF-EMPLOYED

13

STUDENT 1

ACADEMIA 2

EDUCATION 2
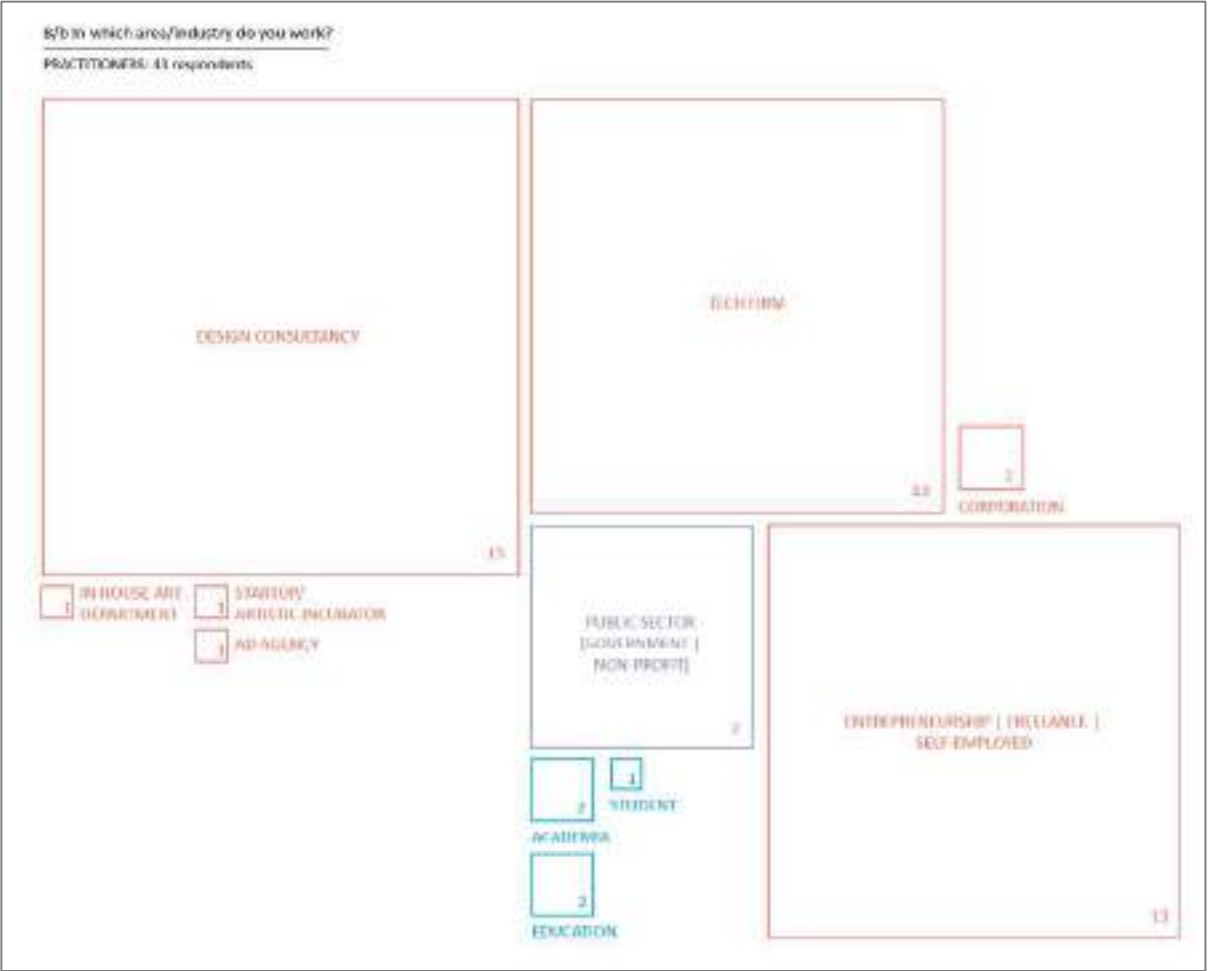
Figure 7: Industry in which practitioners responding to the survey work.

305
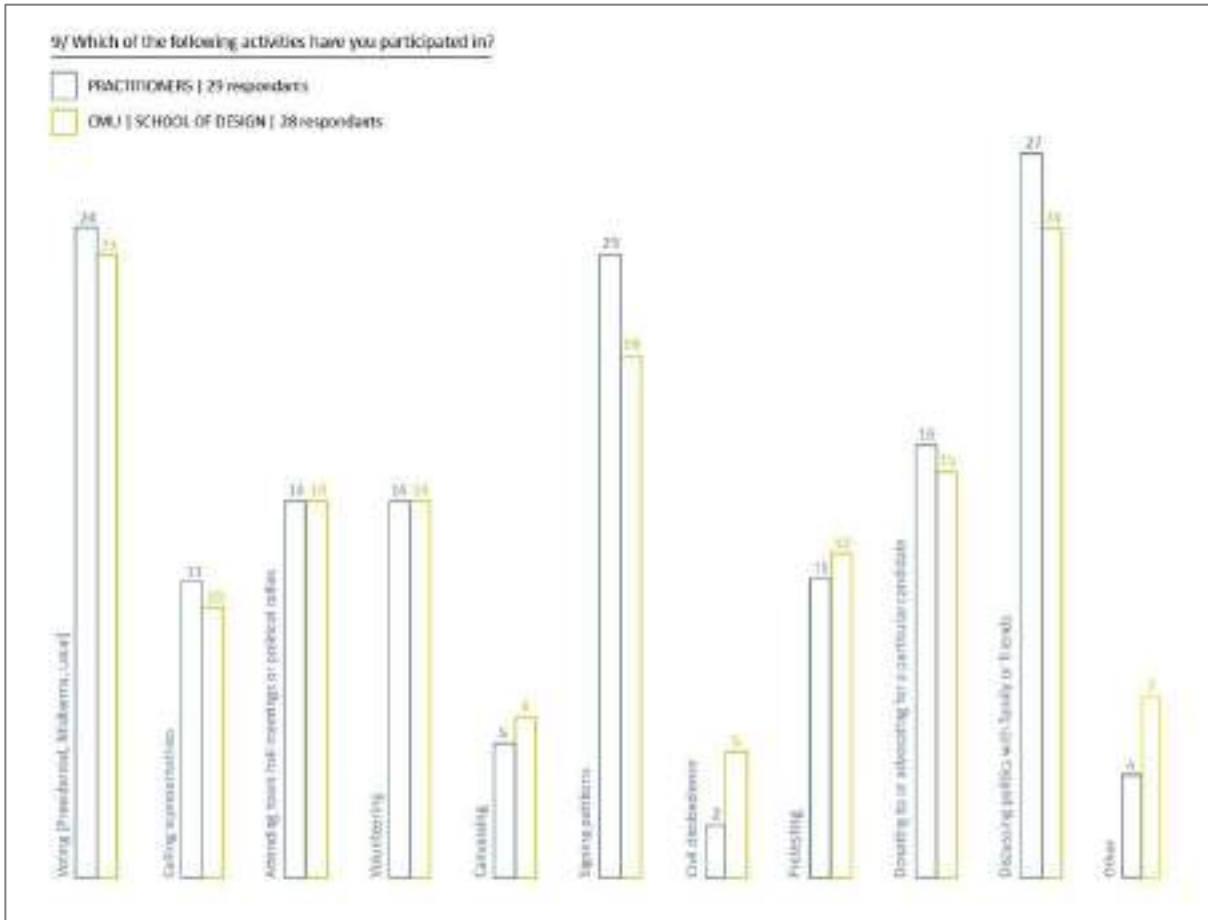
Figure 8: Political activities in which responders have participated.

Appendix 2: WORKSHOP

Conducted in the School of Design at Carnegie Mellon University and via Survey Monkey
Paper based workshop: 8 participants
Digital exercise: 7 participants
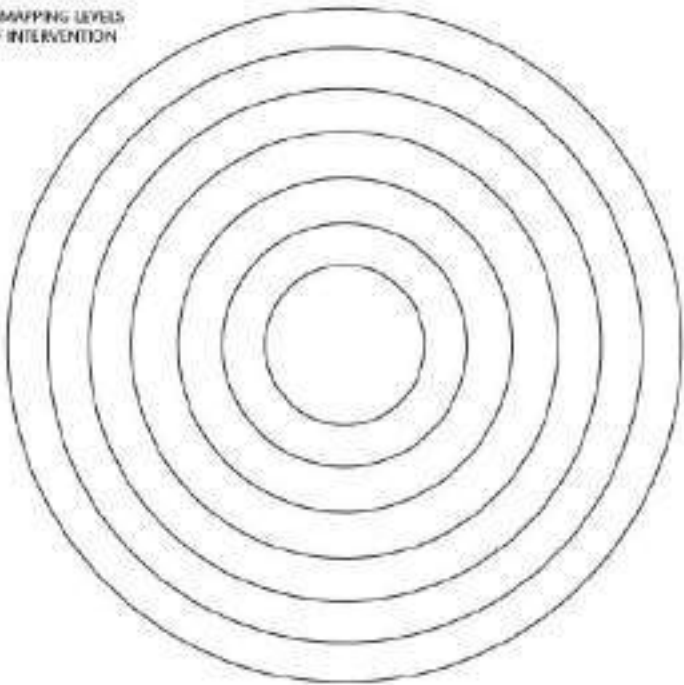
Figure 1a: Paper-based workshop material, cards and map, used during the workshop.

Figure 1b: First step of completing the workshop worksheet, with roles related to political participation ranked and numbered on the left.

Figure 1c: Step 2 of the workshop sheet, with participants listing points of intervention, ranging from where they felt they have the most influence and agency (innermost circle) to the least influence (outermost circle).

Figure 1d: Fully completed workshop sheet, where participants were asked to place the numbers of the various roles at intervention points on the map where they felt that role was most appropriate, visually connecting the roles to the points of intervention. (Red lines added here for illustration purposes).

As a final exercise, participants were asked to choose a particular social or political issue that was important to them, and then design an intervention for that issue utilizing a particular role at a single intervention point on the worksheet. If, for example, this individual indicated that gun control was important to them, they might choose to devise an intervention that can mobilize citizens around the university to lobby for gun control.

5. How do you perceive your participation as a designer within the following roles? Rank the roles from how you are most to least involved. Please add your own if needed and mark as N/A whichever are irrelevant.

::	⬍	Be an activist	☐ N/A
::	⬍	Facilitate conversations	☐ N/A
::	⬍	Change perceptions	☐ N/A
::	⬍	Advocate for the under-represented	☐ N/A
::	⬍	Create platforms	☐ N/A
::	⬍	Educate and inform	☐ N/A
::	⬍	Design for policy	☐ N/A

7. List at least 3 potential points of intervention from where you feel you have the most influence and agency (1) to the least influence (8). Examples: family, university, city, country, world

1	
2	
3	
4	
5	
6	
7	
8	

8. DESIGN EXERCISE

Think of a political or social issue that is important to you. Then, select a point of intervention from those that you just listed, and the designer's role where you are most involved. Devise a way that a designer in that role might intervene in the political or social issue you chose.

For example, if gun control is important to me, and the university is where I feel I have most agency, and I stated that the role of "changing perceptions" is where I am most involved, I will devise an intervention that can change perceptions of gun control around the university campus.

Figure 2: Digital adaptation of the workshop sent out via Survey Monkey.

Results

Roles

RANKED AS THE MOST IMPORTANT ROLE:

RANKED AS THE LEAST IMPORTANT ROLE:

PAPER-BASED VERSION

EDUCATE & INFORM   3

CHANGE PERCEPTIONS   3

1   1 MOBILIZE CITIZENS

N/A
participants only ranked the roles
that appealed to them and discarded
the others.

DIGITAL VERSION

EDUCATE & INFORM   3

FACILITATE CONVERSATION   2

CREATE PLATFORMS   1

DESIGN FOR POLICY   1

DESIGN FOR POLICY   3

BE AN ACTIVIST   3

EDUCATE & INFORM   1

Figure 3: Roles given out during the workshop and in its digital adaptation. Participants were able to propose new roles according to appropriateness.

RELEVANT ANSWERS FROM THE DIGITAL VERSION |
Practice-based approaches with sketching
and drawing involved.

RELEVANT ANSWERS FROM THE DIGITAL VERSION |
Recurrent variations of "Educate and inform"
and "Facilitate Conversations";

"I think that as an educator I have a natural opportunity to educate and inform, but I also think that I don't view these items as separate from one another (neither the roles, nor the points of intervention)."

"I envision an intervention in which the creation of artifacts serve as a way to facilitate conversations among members of a specific community."

"[...]see what the school's official stance is and to do a educational campaign around gun reform."

"I feel I have the most agency with family and work activity to change perceptions by facilitating conversations. I'm actively working to build a platform [...] that will create a broader reach for this agency."

"I could educate students about the issue through a course assignment using data/interviews from those affected by gun violence as a way of showing students the impact that policy has on individuals."

"I think it's the role of the designer is to facilitate conversations between people from all sides of the debate to see where there is common ground and where there is not."

Figure 4: Roles ranked as the most/least important by participants.

Intervention points

GIVEN ROLES:	PROPOSED BY PARTICIPANTS:
PAPER VERSION > EDUCATE AND INFORM > ADVOCATE FOR _____ > CHANGE PERCEPTIONS > BE AN ACTIVIST > FACILITATE _____ > CREATE PLATFORMS > DESIGN POLICY > MOBILIZE CITIZENS > BREAK DOWN BARRIERS > REPRESENT _____ > BE AN ANGENT OF CHANGE > CHALLENGE HEGEMONY/AUTHORITY	> REPRESENT A MINORITY > ADVOCATE FOR THE ENVIRONMENT > FACILITATE CONVERSATIONS BETWEEN DIVERGENT OPINIONS > ADVOCATE FOR DESIGNERS TO BE MINDFUL ABOUT POLITICAL AND POLICY IMPACT OF THEIR WORK > REPRESENT MINORITY VOICES, ESPECIALLY FEMALES + ETHNIC GROUPS > ADVOCATE ACCESSIBILITY AND REPRESENTATION
DIGITAL VERSION > EDUCATE AND INFORM > ADVOCATE FOR THE UNDER-REPRESENTED > CHANGE PERCEPTIONS > BE AN ACTIVIST > FACILITATE CONVERSATION > CREATE PLATFORMS > DESIGN FOR POLICY	> GRADUATE STUDENT ASSEMBLY OUTREACH > COLLABORATE WITH KNOWLEDGE EXPERTS > CREATE AN OPEN ENVIRONMENT FOR VARYING POLITICAL PERSPECTIVES > VISUAL ARTICULATOR

Figure 5: Most recurrent points of intervention with the most/least amount of influence/agency.

Overlapping roles and intervention points
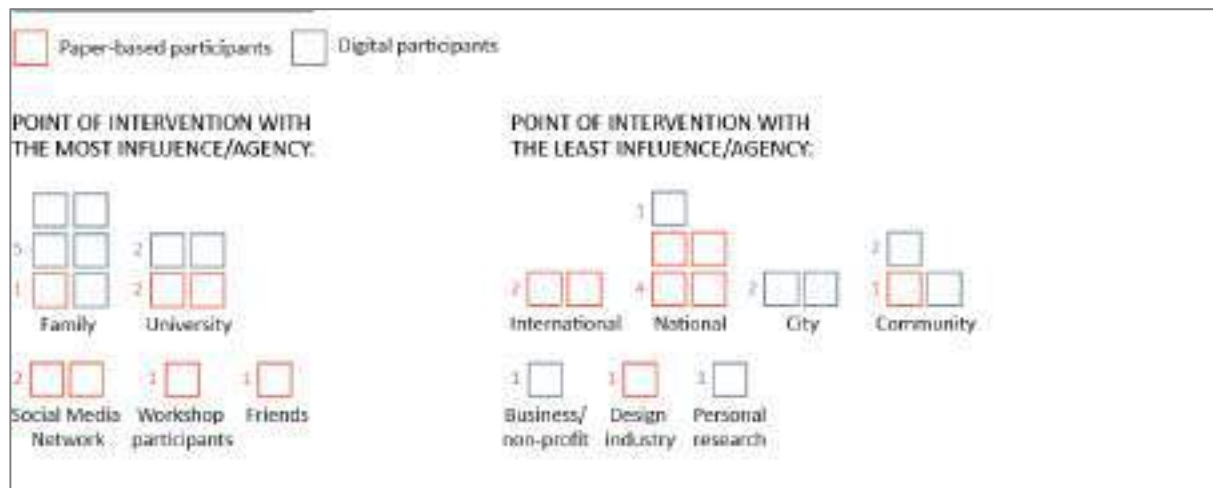
Figure 6: Participants were asked to choose a wicked problem of their preference. To tackle it, they needed to locate overlapping roles and intervention points determined in part 1 and 2 of the workshop (Figures 1 and 2). Finally, they had to propose a design-led form to intervene in those overlapping nodes in regards to their wicked problem.

In Pursuit of Design-led Transitions

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This paper contributes to the growing maturity of transition design. A Dutch transition design project with the Dutch Government and food sector is presented and reveals the challenges of designing at a system level. Reflection on the project reveals two insights that were not factored within the project but in retrospect require the attention of transition designers; (1) the timing of the transition relative to the surrounding environment and; (2) the velocity or speed at which a transition can be fully enacted. The paper shifts to investigating change theories to identify possible directions to address these challenges. Theoretical implications are concluded from this investigation. This paper deals with politics, power, democracy, leadership, and enablers and inhibitors of change.

Keywords: power, policy, leadership, ecosystem, pluralism

Introduction

It is a time of unrest described in various strong rhetorical forms as a *time of many problems* (Margolin, 2015), an *increasingly complex world* (Buchanan, 2015), a time of *rapid changes* (Bucolo, 2015), and *transience* (McGrath, 2013). The successful processing of this subject matter has elevated design (and designers) to areas of organisational reform, system[1] design, policy reform and technology related transformations (Muratovski, 2015). The witnessed rise in the statue of the design discipline is eloquently described by Richard Buchanan as the *design movement* (2015). In short, it has been a busy period for designers.

One particular growth area in the design movement is the increasing popularity of design-led innovation. Design-led innovation provides organisations with the means to negotiate uncertainties and innovate to create and capture value. Design becomes a source of new thinking and action and informs the strategic direction of an organisation. Yet focus is shifting again. Design is now being explored beyond the scale of individual organisations. Questions such as 'how might design assist national economies to thrive during uncertainty', and; 'how will international carbon emission be lowered while maintaining social and economic stability' are now open to designers (Irwin, 2018). Such an increase in scope has led to methodological developments within the discipline. *Transition design* is one such emerging methodological development (Irwin, Kossof & Tonkinwise, 2015). In particular, guidance on how to apply transition design given the inherent scaling challenges and political implications associated with working at a system-level remain an area for further attention.

The aim of this paper is to contribute toward the methodological emergence of transition design. The paper reveals how the urgency for transition design can be arrived at from an alternative path to social innovation -

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[1] The terms system and ecosystem will be used interchangeably from herein

via design-led innovation. Design-led innovation is acknowledged as a means to drive organisational transformations.[2] Transitions do require the collective transformation of public and private organisations together (Geels, 2002) which acts as an interaction point for design-led innovation. This logic is explored through a review of literature before the paper shifts to describing a Dutch case of transition design in effort to explore the current state of the methodology. Literature on policy making (e.g., Bason, 2013), technology forecasting (e.g., Adner & Kapoor, 2017), innovation (e.g. Christensen, 1997), management (e.g., McGrath, 2013) and ecological economics (e.g., de Jesus & Mendonça, 2018) is consulted in order to draw upon multidisciplinary perspectives that reflect the complexity of transitions literature. Based on these insights, theoretical implications for designing transitions are presented.

The Design Movement

Central to design, is the notion of design being capable of addressing wicked problems (Buchanan, 1992; Rittel & Webber, 1973). Designerly strategies (such as problem-framing) are particularly, if not uniquely suited to dealing with ill-defined or wicked problems (Cross, 2007; Forlizzi, Stolterman, & Zimmerman, 2009; Gaver, 2012; Stolterman, 2008). Buchanan presents the four orders theory of design in which wicked problem-solving are encountered (1992; 2015), see Figure 1. Buchanan's *four orders* deconstructs the nature of design problems, relating activities required to prescribed solutions. As Buchanan states of the four orders, "the *evolution* of the design professions from graphic and industrial design to interaction design and, then, to the design of systems, environments and organisations is the hallmark of the current design movement" (2015, p. 11). Since the turn of the century, a series of new approaches to design have evolved from human-centred foundations. From transformation design to service design, design-led innovation and strategic design (see e.g., Calabretta, Gemser & Karpen, 2016; Jones, 2017; Bucolo et al. 2012). This diversification away from a heritage of industrial design is an indication of the discipline's increasing maturity, a journey supported by the positive reception of the designers within newfound contexts of organisational reform (Elsbach & Stigliani, 2018) and policy arenas (Yee & White, 2016).

Figure 1: Four Orders of Design - Buchanan, 2015

Design-led Innovation to Design-led Transitions

Design-led innovation as a concerted approach was realised in response to growing pressure on the Australian manufacturing sector from nearby high-productivity and low-wage competitors based in Asia. A design-led approach to innovation encapsulates the methods, skills and culture of design throughout the entire process of creating and capturing value within an organisation. The approach conceptualised by Bucolo, Matthews and Wrigley (2012) assists an organisation to diversify by gathering and acting upon novel insights from customers

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[2] I choose to make a distinction here for clarity. *Transformation*s are changes at an organisational-level, and *transitions* are changes at the system-level.

and stakeholders. Novel insights become a basis for differentiating innovation and a vital source of top line growth for firms experiencing the pressures of market competition. Cases reveal that design-led innovation can positively contributes to, and can even drive organisational transformations (Doherty, Wrigley, Matthews & Bucolo, 2015; Townson, Matthews & Wrigley, 2016; Krabye, Wrigley, Matthews, & Bucolo, 2013).

While design-led innovation began with a motive to support the Australian manufacturing sector, interest quickly grew from the broader business community. Of note is the mobility sector (Garret, Straker & Wrigley, 2017; Price & Wrigley, 2016). General findings from these initial years of research are contained in the work of Wrigley (2016) and Price, Wrigley and Straker (2015). Design-led innovation has also transferred successfully to the European context, involving partnerships with an automotive company (Bryant & Wrigley, 2014) and software developer (Bastiaansen, Price, Govers & Machielsen, 2018). Parallel efforts to bring design-led innovation into the public sector have also been positive (Bason, 2013; Camacho, 2016).

Focus has turned progressively from the scale of individual organisation and impact of design, toward a macro perspective of the potential impact of design across networks of organisations. This shift entails scaling design-led innovation, and more broadly design as a source of improved competitiveness for single organisations, to the resilience of a network of organisations – an entire sector, industry or indeed a national economy. Fraser (2012) raises the potential of design to be a source of an economic prosperity, describing an *innovation economy* where enterprises compete with and through design. Similarly, Bucolo (2015) extends the design ladder (Figure 2) to describe *design as national competitive strategy* (step 6) whereby a government designs and implements macro-economic strategies that promote national resilience. The Australian paradigm prevails in the work Peppou, Thurgood and Bucolo (2017). Yet there are also parallel international efforts to elevate design to source of system-level impact. Of note are methodology developments that address:

- The socio-technical → thing-centred design (Giaccardi, Speed, Cila and Caldwell, 2016), DesignX (Norman & Stappers, 2015);
- The socio-cultural → infrastructuring design (Hillgren, Seravalli & Emilson, 2011), and;
- The socio-economic → Design-led innovation (Bucolo, Matthews & Wrigley, 2012), design driven innovation (Verganti, 2009).

Another emergent methodology is transition design. Transitions are more prominent within fields such as policy development and technology forecasting. Journals such as *Futures, World Development, Research Policy* and *Technological Forecasting and Ecological Economics* contain work that is topical to the transitions of developing nations and adoption of new technology innovation systems. Transitions represent the collective shift of multiple levels of a system (Geels, 2002). Geels describes three levels that must be aligned for a transition to take place. These levels are

1. The 'niche' level where innovation occurs;
2. The 'regime' level where policy frameworks operate, and;
3. The 'landscape' level where megatrends and collective motivations reside.

As Geels, (2011, np) writes:

Although each transition is unique, the general dynamic pattern is characterised by transitions resulting from the interaction between processes at different levels: (a) niche-innovations build up internal momentum, (b) changes at the landscape level create pressure on the regime, and (c) destabilisation of the regime creates windows of opportunity for niche-innovations.

As an example, the sustainable energy transition requires innovation to develop renewable energy products and services that are attractive to citizens (niche). The organisations that are responsible for that innovation must also undergo a transformation. New policy frameworks (regime) that promote renewable energy sources are required too so that the existing finite energy system is phased out. Finally a collective movement toward acceptance of the need to act on climate change (landscape) creates a sense of urgency (Kivimaa & Kern, 2016). A window of opportunity is opened and a transition can take place. When these layers realign and stabilise to a new state, a transition is said to have been enacted. For this reason, transitions require overcoming 'lock-ins' or entrenched ways of operating, thinking and being at each level (Lachman, 2013). Hence, transitions also require a build-up of forces for change that move dynamically between citizens, industries and political division (Frantzeskaki & de Haan, 2009). This build-up takes time and inherently involves tension (Jorgensen, 2012). Overtime the existing system is creatively destroyed and replaced with a new system and accompanying paradigm (Kivimaa & Kern, 2016).

The strength of transition theory is in the comprehensive way retrospective cases are described. However, Lachman (2013) also describes this as a 'catch 22', as literature offers limited practical guidance for designing and enacting transitions. Further transition literature points generally to the collaborative effort and engagement between niche and regime actors. However, actual description of practices required to facilitate this interaction are vague (Kemp & Rotmans, 2009). Martens and Rotman (2005) do point toward anticipatory approaches that are reflexive, test assumptions and drive innovation. An opportunity for design is apparent.

From a design perspective, transitions theory shifts rhetoric from commercial principles such as viability and competitiveness associated with *design x innovation* (Dong, 2015) to a holistic perspective – an 'interconnectedness' of social, economic, political and natural systems to address present and future wicked problems (Irwin et al. 2015). Wicked problems such as climate change, loss of biodiversity, and increasing wealth disparity require the design and implementation of new products, services and systems. Such change in rhetoric elevates design to new urgency. Irwin et al (2015) view transition design as a natural extension of existing design approaches, view visualised in Figure 3.

As Irwin (2018) describes, designing transitions involves three repeating phases; (1) reframing present and future; (2) designing interventions, and; (3) waiting and observing. The methodology places emphasis on envisioning long-term futures that are desirable for a holistic range of stakeholders, then backcasting toward feasible realisation steps. The present context is also reframed, for example how Leitao (2018) reframes the narrative of western modernity to explore new notions of past and present . These new perspectives inform envisioning that is intended to break away from conventional 'lock ins' described by Lachman (2013) that reinforce the present ecosystem. Interventions are then built and enacted at various system-levels that are informed by Geels' multi-layered perspective (MLP) (2002). These interventions are intended to create pressure for change between and across levels of a system. Waiting and observing as evaluative activities then determine the status of the interventions before a series of reframing occurs again.

Figure 2: Design Ladder Extended – Bucolo 2015. Reaching national transitions

Figure 3: Emerging Discipline of Transition Design – Irwin et al. 2015

RtD: Dutch Transition Design Case

Presenting a practical example of transition design provides insight into the nuances and emergent state of the methodology. As part of a collaboration with the Dutch Government's *X-Lab*, Youngsil Lee (2018) lead a design team to create a *kitchen-code service* to promote healthy and sustainable daily cooking habits for Dutch citizens. The design team was multidisciplinary; including designers, ecologists, industrial engineers and policy makers. The project, *From things to systems, and back: a thing-centric approach to protein transition in the Netherlands* explored socio-cultural and socio-economic circumstances of food purchase, preparation and consumption. This construction by Lee involved the integration of *commons* theory (Ostrom, 2015) as mechanism to create tension between new daily individual actions and the food industry. This approach is consistent with Geels' multi-levelled perspective (2002).

Lee designed a service to encourage changes in how food is produced, regulated and consumed. The strength of the project lies not only in the outcome – a new service proposition - but in the conceptual construction of a spatiotemporal axis of the kitchen to which the problem of unhealthy and unsustainable societal eating habits reinforced by current agricultural and food processing is confronted. Lee establishes a vertical axis from individual consumer, to family, community and society and uses each level as an interlinked design context (Figure 4). The kitchen context is reframed as a decision making space and becomes the vertical axis. Kitchen tools that afford certain cooking techniques and practices are identified as amplifying effects for the diffusion of change at each horizontal rung of the axis. The home kitchen, the commercial kitchen, the restaurant kitchen, the farmer's kitchen all act as decision making spaces that determine supply and demand within the greater food system.

Lee and her team designed a service intervention that would support policy efforts to reduce meat-based protein consumption in the Netherlands. Overtime, the home cook would be encouraged to use green protein (as opposed to animal-based protein) sources in purchasing and cooking decisions. When buying new green food products, the *kitchen-code service* would assist individuals and groups to learn new recipes based on what cooking utensils were available in their own kitchen context. Should the entire Dutch population cease to purchase and consume meat overnight, a supply-chain induced disaster would occur with waste accumulating toward crisis point. Under the kitchen code service, policies would need to be devised that would support farmers to shift their production over time to ensure they were producing food relative to demand and substituting meat based farming with green alternatives.

The case of protein transition within the Dutch context is an example of the emerging state of transition design. The project reveals that the task of building conceptual and theoretical integrity within the methodology must take place in situ while experimenting via *research through design*. An observation throughout the project was that the ecosystem was 'not ready' to embrace such thinking about the reduction of meat-based protein sources. More insight about the state of the ecosystem was required to determine when the transition could be enacted. The production of meat-based protein, especially in the dairy industry, in the Netherlands is considered part of the socio-cultural identity of the country. The Dutch are proud of their cheese, milk and dairy products which are exported globally. In this sense, the project felt political resistance. While the kitchen-code service has not been implemented, the principles underpinning the protein transition and kitchen code are now informing policy making.
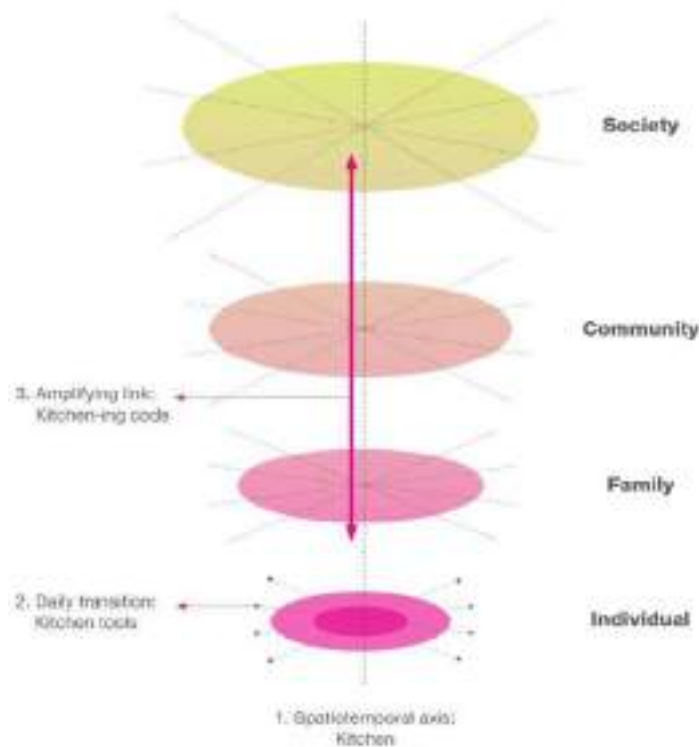
Figure 4: System diagram of the Kitchen Concept developed by Lee (2018) and inspired by Geels (2002).

A second key insight gained by the researchers was a sense that how quickly a protein transition could be fully enacted across an ecosystem. The scale of changes within the agricultural industry in particular would take many years to stabilise. The protein transition designed by Lee and colleagues provided an idealistic vision of steps required to move toward a new food-system. Necessary transformative actions and the political upheaval within each participating organisation was not factored into the design of this greater transition. In retrospect these two factors of timing and speed were critical. In the next passage of this paper, I look to theories associated with change and growth to learn more about how timing and speed are addressed in transitions literature.

Looking to Change Theories for Guidance

Transitions requires daily changes at the scale of the individual. In daily life there are many transitions already underway. Transitions can manifest in adoption of new products and services; for example from combustion to electric vehicles or from non-recyclable plastics to organic alternatives such as alginate based materials. These two transitions can be considered part of the general sustainable transition. This transition involves an unwinding from an industrialised carbon-intensive economy toward notions of renewable energy, reuse, repair, repurpose and recycle (de Jesus & Mendonça, 2018). The challenge of this transition is not to change one individual, but to scale change viably across the entire value chain associated with production to consumption of goods and services.

Innovation can be an enabler here, as Schot and Kanger (2016, pg 76) note; 'As Innovation enabled the development of an industrial, carbon-intensive economy, it is plausible that ("transformative") innovation may now be the vehicle for triggering a new, "green" transition'. However, the same approach to innovation prioritising efficiency and productivity that hailed in the industrial era cannot be repeated. With the power of retrospect and with the presence of an information economy, it is clear that an approach that integrates ecological and social factors into an economic and technical 'transition' must be championed. Here transition design as source of innovation that integrates socio-cultural, ecological, economic and technology developments is of significant relevance.

It is important to note, that I view technology as a scaffold for new types of actions that collectively build pressure for change. This viewpoint is consistent with technology innovation system theory (TIS) that forms one direction within transition literature (Hekkert, Suurs, Negro, Kuhlman, Smits, 2007). TIS involves viewing the co-evolution of technical systems with social and economic institutions. This viewpoint has synergies to the

theoretical underpinnings of design-led innovation. Notably how design as an alternative approach to innovation can stimulate cultural and organisational transformations that benefit society. TIS theory is closely related to strategic niche management (SNM) which offers another nuanced direction within transitions literature (Kemp, Schot & Hoogma, 1998).

The S-Curve

The seminal work of Christensen (1992; 1997) provides valuable starting point to explore innovation and system-level change. The s-curve is a theoretical model that fundamentally describes the phenomena of growth in relation to time (Christensen, 1991; 1997). The s-curve, named for its approximate shape of an 'S', has been applied to study population growth (with the advent of the *pearl function*), adoption of products and services, and the efficiency of technologies during operation (see Figure 5). Growth begins slowly. When the tipping point or critical mass is achieved, growth accelerates and can even be exponential. Eventually growth plateaus due to maturity or stabilisation of the phenomena. Martens and Rotmans (2005) contextualise the s-curve within transition studies, following a similar route to stabilisation. Martens and Rotmans place greater emphasis on describing the acceleration phase where growth occurs and visible structural changes take place between interactions of various levels; socio-cultural, ecological, economic and intuitional.
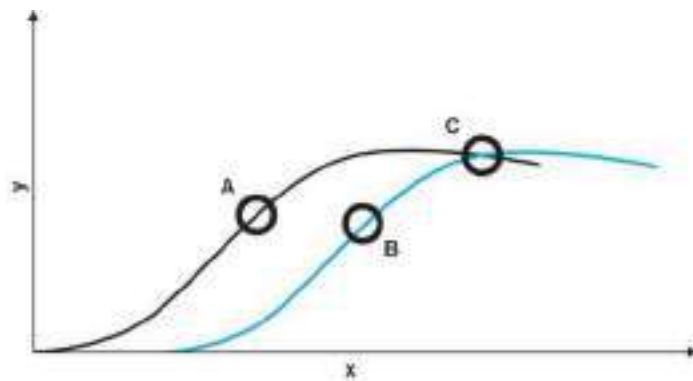
Figure 5: S-curve model; A) growth of product 1 sales; B) growth of product 2 sales and C) inflection point where growth curves intersect.

Depending on the nature of a growth trajectory (Dosi, 1982) and competitive forces at play (Porter, 2008), a technology or firm represented by an s-curve will be displaced by another firm or technology of superior performance. The existing firm or technology is unable to match the performance and capabilities of the newcomer. The newcomer enjoys market success until its own position is disrupted by a new alternate product or service of superior performance. A series of *creative destructions* take place. When observed from distance, this process is akin to general progress.

The notion of *disruptive technologies* pioneered in the work of Christensen (1997) has deeply influenced the direction and shape of management and technology disciplines. For example the positive economic influence of competitive forces (particularly the threat of the entrant) has been identified as a stimulant for investment in research and design (R&D). R&D investment has historically been a key metric underpinning prosperous economies (Foster, 1986). Design is already known to assist organisations to flourish under the associated innovation challenges of the competitive arena. This position is acknowledged in practice and academic alike (Rae, 2016; Sheppard, Kouyoumjian, Sarrazin, & Dore, 2018).

The Dynamics of an S-Curve Jump

When the vertical parameter (y axis) is extended and two or more s-curves are represented, discontinuities can be identified. The transition from one growth curve to another is termed by Asthana (1995) as the *s-curve jump* (see Figure 6). The notion of 'jump' describes a moment of increased activity associated with springing into a new mode. Usually this jump requires significant capital outlay and redistribution of resources to change from one operating system to another. Asthana (1995, p.15) describes, "Properly used, an s-curve analysis helps reduce the risk of premature dismissal of technology." This carries implications for transition design such as when to phase out or replace existing infrastructure, systems and policies associated with the industrial era

or predecessor ecosystem. While the term jump carries the denotation of fast speed, often transitions may take many years to enact.

Conditions surrounding the s-curve are inherently uncertain and unstable. In these conditions it is common to find a diffuse range of future visions – note plurality. These visions may also be of varying salience, with some visions of the future already informing decision making. Change becomes difficult as tension builds and disagreements persist. It is common to find power-structures that both enable and inhibit change based on individual agenda. Such conditions are ripe for leadership (Asthana, 1995).
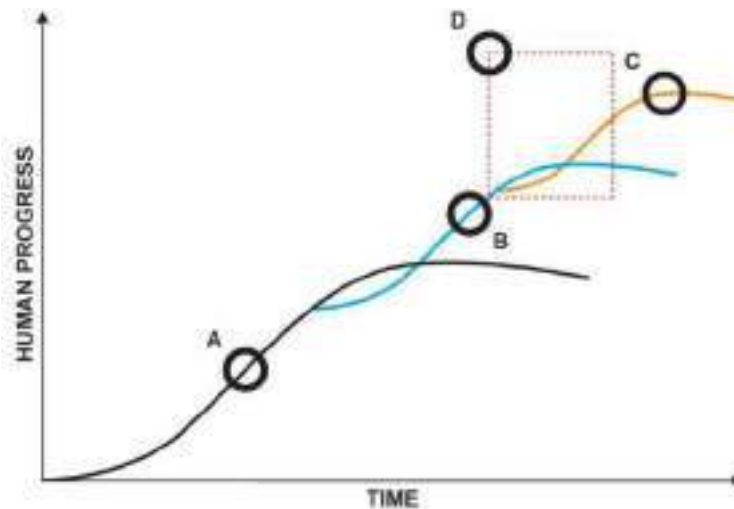
Figure 6: Consecutive s-curve models describing human progress informed by the thought leadership of Harari, (2015); A) growth of the agrarian age; B) growth of the industrial age; C) predicted growth of high-tech age, and; D) scope of current transition period. Note bene: scale is representative only but as Harari notes, each age has approximately halved the time period of the previous age.

Timing of Transition

Identifying the timing of a transition implies a reliable reference point. Here, the theoretical relevance of the s-curve (Christensen, 1991; 1997) returns. Within this article relative the notion of being early, late and a laggard within an adoption or s-curve emerge as a way to describe the *timing* of transition. However the notion of an s-curve 'jump' (or transition to new system) also complicates this perspective as the discontinuities occur across the vertical axis as well as the horizontal axis. The work of Asthana assists in understanding the dynamics of the s-curve jump. The jump from industrialisation to high-tech era (citing Harari, 2015) is perhaps the broadest example to contextualise this theory. The dynamics of this jump are further illustrated in Figure 7. The figure caption describes how each transition involves loss as the s-curve jump takes place.
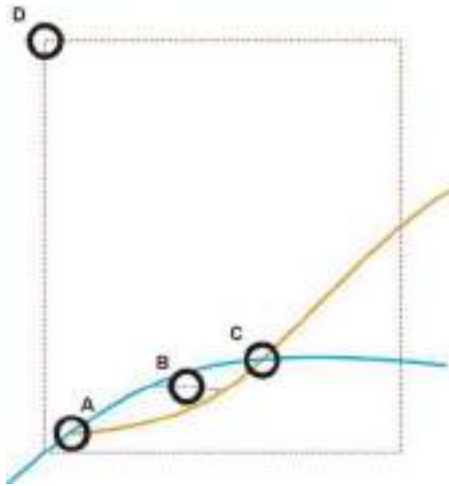
Figure 7: Dynamics of the s-curve jump; A) early mover must make do with an early loss to the performance of the system yet becomes well positioned (intellectually and with necessary infrastructure) for gains when the system begins to perform; B) mid mover must invest considerably in order to transition to the lower trajectory of the new system but can learn from the actions of the early adopter ; C) late mover endures the slowing performance of the older system, and must invest considerably to bridge the gap to now highly performing and mature system, and; D) scope of transition (see Figure 6 for reference point).

Recent work by Adner and Kapoor (2017) builds upon Asthana, using s-curve theory as a way to predict how and when new technologies should replace predecessors. The paper *Right tech, wrong time*, identifies four possible scenarios where technology innovation system transitions occur. These four scenarios are illustrated in Figure 8. Referring to Figure 8, Adner and Kapoor (2018, pg.60) write;

> *Traditional substitution of a new technology for an old one is shown with two S curves. (The solid lines). A more holistic view adds two dynamics. First if the new technology depends on the emergence of a new ecosystem, it becomes dominant more slowly (tightly dashed line intersecting at A and C (sic)). Second, the old technology's competitiveness is extended if it can benefit from performance improvements in its surrounding ecosystems (loosely dotted line intersecting at B and D (sic)).*
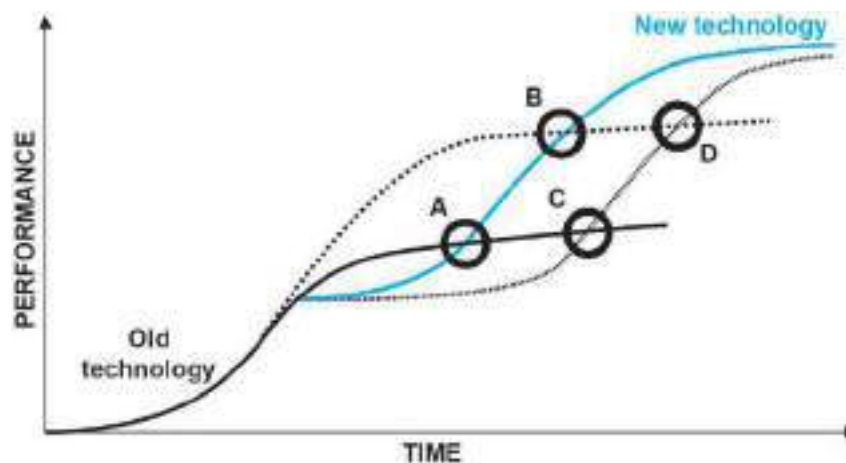
Figure 8: Right tech, wrong time – Adner and Kapoor (2017)

Figure 8 contains two s-curves representing the substitution of an old technology by a new technology. The tightly dashed line (intersecting A and C) represents a delayed arrival of a new technology. The loosely dotted line (intersection B and D) represents the extension of an old technology. Four circled points are annotated as A, B, C and D. These points represent:

- *Point A - Creative destruction.* Described as the classic and fastest substitution of technologies, a new technology is supported by a new and ready ecosystem. The old ecosystem cannot be significantly improved. It is the ideal moment to substitute technologies.
- *Points B - Robust coexistence.* Old technologies have sustained relevance, through improvements to the existing ecosystem. Old and new technologies temporarily coexist. For example the coexistence of combustion and hybrid vehicles, yet the general shift toward an electric vehicle supportive ecosystem is taking place.
- *Point C – Illusion of resilience.* The substitution of an old technology by a new technology occurs with little performance gains as the old ecosystem seems outdated. Yet, the new ecosystem seems to be 'not ready'. It is important to take active steps toward transitioning to a new technology ecosystem.
- *Point D – Robust resilience.* New technologies encounter strong resistance to adoption. The existing ecosystem has great potential to be improved, while the new technology ecosystem requires significant updates before becoming viable. A gradual substitution takes place. Adner and Kapoor provide the example of the barcode to RFID chip. Barcode technology is still relevant, and indeed has been resurgent with QR code scanning allowing the consumer to benefit from simple services and products.

Adner and Kapoor develop a working theory that scales from single technology to implications for the broader technology ecosystem. This logic provides decision makers with a set of clues to analyse a technology in relation to the broader ecosystem. The notion of 'ecosystem' encapsulates technology, consumers, businesses and policies that allow new technologies to be commercialised and part of daily life. Consider how solar technology has been developed, subsidised and adopted, leading to new behaviours and actions that are crucial to a wider energy transition.

Another example of how Adner and Kapoor's work could be harnessed is as follows. A transition designer may identify similar to Iansiti and Lakhani (2017), that Blockchain requires an extensive new ecosystem – most notably total reconfiguration of prevailing financial systems and governance structures to allow peer-to-peer transactions and distributed databases. This process of change may take twenty to thirty years to fully realise. From a societal perspective, the designer might identify that significant deinstitutionalisation is required to shift responsibility and trust to each individual citizen. From this analysis the designer can take reasonable course of action; perhaps plan for gradual improvement of the current ecosystem toward one more supportive of Blockchain's utility – a strategy akin to *robust resilience*.

In sum, the work of Adner and Kapoor offers a strategic approach to consider how and when an old technology can be substituted by a new technologies by analysing the state of the broader technology ecosystem. That ecosystem involves the political, structural, economic and societal elements at play. While technology-focused, an appropriation of this approach can support the efforts of transition designers to realise sustainable futures by analysing the conditions of the prevailing social, cultural, political, economic ecosystem.

Velocity of Transition

One factor implied within the work of Adner and Kapoor, is the velocity to which a transition can be enacted when the timing is 'right'. For lack of suitable terminology here, I will refer to this as the *velocity of transition*. Table 1 contains six transitions drawn from literature used to explore the constructs of timing and velocity. Enablers and inhibitors of change are noted. As previously identified, the timing of a transition may be early, late or somewhere in between. The velocity of a transition can occur gradually or abruptly. I note here that gradual transitions can take more than 10 years. While abrupt transitions occur rapidly below this 10 year time scale. This 10 year demarcation requires much further inquiry to define but for now is a practical reference point. In the next paragraphs I will explore more examples that are summarised in Table 1.

Not all transitions occur quickly. In fact many decades may be required to transition from one operating system to another. These transitions are *gradual*; for example over the last 40 years, the 'Energiewende', or German energy transition from finite to renewable sources has been taking place. This gradual transition has occurred to unwind reliance on the infrastructure associated with the existing energy system. The slow dismantling, reconfiguration or replacement of finite energy infrastructure mitigates social disruption to employment and gross domestic product (GDP). Strong leadership (and even bipartisan unity) was initially required to develop policy that could remain protected overtime, thus allowing implementation beyond electoral cycles.

Similarly, a gradual transition in the Australian energy sector has been occurring for contrasting reasons. During the global financial crisis, Australia was one of the few developed nations to experience growth. Such stability came from the export of minerals (coal, iron ore) to nearby developing trade partners such as China and India. As China's import of Australian coal has slowed in light of its own energy transition, an increase of export to Japan has risen in lieu of closure of the nation's nuclear energy plants following the 2011 earthquake and tsunami. The inhibitors to change associated with the cost of new infrastructure hold such heavy political weight that exploring clean energy alternatives was suppressed for many years. In short, sustained success brought through mineralogy instilled the thinking, 'why change when something is successful'. The country now finds itself on a clean energy precipice. Partnership between the South Australian State Government and Tesla to implement a solar-battery strategy to stablise an unreliable electric grid will be closely followed by many.

An example of an abrupt change is the Chinese Energy Transition. With fast leadership mechanisms enabled by a socialist republic model; President Xi Jingping was able to quickly pass reform and begin capital outlay toward replacing finite energy resources and infrastructure with renewable alternatives. Interestingly, even with the authoritative governmental model of the People's Republic of China, it was vocal protest of citizens living in mega-cities such as Beijing and Shanghai facing serious air quality challenges that encouraged a transition. China still remains one of the largest polluting nations per capita. However, its investment shows how seriously the transition is being pursued. In 2017, China invested more than half of the global renewable energy capita; nearly $280 Billion US dollars (Energiewende Team, 2018). Interestingly, the idea that China's authoritarian model of governance being effective during a system-level transition prompts critique of dialogue-based processes for reform associated with democracy. Such an example does warrant consideration into how to establish a shared vision through democratic processes like that of preceding unity leading to the German energy transition. As Hendriks notes, unfortunately sometimes politics just goes on and on (2009).

Similar abrupt system-level transition occurred in Sweden on 3 September 1967, when driving switched from left side to right side of the road. *Dagen H* (Day H) involved a temporary ban of vehicles driving on roads while intersections were reconfigured. In this case, the existing infrastructure of the road remained a stable factor – allowing a fast transition to take place. This transition was fully enacted within months. Further, an abrupt transition occurred when penicillin was discovered by Dr. Alexander Fleming in 1928. It was not until 1940 that mass production of the drug was achieved. Even today, pharmaceutical development takes many years to achieve[3] given tight regulations around clinical trials and human testing. Once produced *en masse*, penicillin rapidly changed medical practices creating the capability to treat bacterial infections that were otherwise fatal. One of the great inhibitors to the transition to *modern* medicine was the ability to mass produce and distribute penicillin. Once the ecosystem was ready for distribution (timing), the change became widespread and fast (velocity).

Table 1: Timing and Velocity of Transitions

Transition	Timing of transition	Velocity of transition	Enablers	Inhibitors
Australian Solar/Wind Energy Drive as a breakaway from previous reliance on coal-fired infrastructure (present);	Late	Gradual	Abundance of natural resources; cost benefits to the consumers with solar in particular; temporary government subsidies; lowering costs of solar panel technology	Entrenchment of finite energy providers lobbying power within the political landscape; immediate trade opportunities for coal/gas in nearby developing nations (for example: India)
Irish Taxi Liberalisation (2000) 20 years after the deregulation and liberalisation trends of the 1970-1980s	Late	Abrupt	Deregulation stemming from new legislation; lower prices passed onto the consumer; population growth; move of inhabitants to urban centres	Labour union protest; backlash from existing industry

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[3] Even today with notable technological developments, it still takes about 10-12 years on average to develop and realise new drugs (US Food and Drug Administration FDA).

Singapore Economic Reform (1965) becoming a strong and independent economic hub	Late	Gradual	Strong charismatic leadership and a powerful vision for independence; government incentive for new ventures; geo-political location on intersection of major trade routes	Existing economic instability as an outcome of WWII; lack of capital reserve
Chinese Renewable Energy Policy (2017 – announces 360 billion dollar investment)	Late	Abrupt	Strong (authoritarian) leadership and vast capital reserve; citizen activism regarding the country's air quality; lowering price of solar panel technology	Significant infrastructure dismantling requiring massive job losses and short term instability
German Energy Transition (Energiewende, 1980 to present)	Early	Gradual	Strong leadership and vision; taking responsibility for long term stability	Unravelling of extensive and successful finite energy resources; criticised publically as a 'financial burden'
Integration of penicillin into worldwide medical practices (Between 1928-1929 and 1940)	Early	Abrupt	The ability to survive simple infections (massive performance gains); suitability of penicillin within existing models of care (injection or tablet form)	Disproportionate supply of the drug to massive demand (scaling issues); religious pushback associated with playing 'god'; capital within the US economy post WWII to stimulate mass production

Theoretical Implications

It is necessary to pause now and identify what theoretical implications can be drawn from growth theories that can aid the maturity of transition design. The implications below hold value to transition designers and designers seeking to work across ecosystems. Some implications are:

- A transition can be modelled as an s-curve 'jump';
- A destabilisation or crisis within an ecosystem during the preceding moments before an s-curve jump is an opportune time for design leadership;
- Theoretically, a transition requires loss. Loss occurs either through performance or capital outlay associated with change. The social element of loss is often overlooked in transitions literature;
- A transition begins with the first decisive action toward change, usually policy or legislative reform, but may also be mobilisation of a population toward change;
- Market mechanisms such as deregulation/regulation can drive very fast changes in supply chain reconfiguration and consumer preference;
- Early yet gradual transitions require strong (and united) leadership that extend beyond electoral cycles;
- Some transitions occur rapidly and successfully because a technology, such as penicillin, provides such a radical performance improvement that it sparks the creation of new ecosystem around it;
- Late transitions often come with the challenge of unwinding entrenched lobbying power between for-profit organisations and government parties who are 'locked in' to the old system, e.g. see the Australian energy transition;
- The illusion of resilience of an old technology within an ecosystem only prolongs the responsibility of change to future generations;
- A transition design approach must factor concepts of timing and velocity in order produce robust design interventions.

Regarding the last implication, 'how to' factor timing and velocity of change within a design process remains an area for further research.

Conclusion

As innovation enabled the development of an industrial, carbon-intensive economy; it is plausible too that innovation may now be the vehicle for triggering a new, sustainable transition. With the power of retrospect,

it is clear that an approach that integrates ecological and social factors into an economic and technical 'transition' must be championed. Here transition design (as source of innovation) is of significant relevance. While some scholars and practitioners have reached this realisation through the evolution of social innovation, my research has led me to a similar point through expansion of the logic associated with design-led innovation – a human-centred yet economic path.

In this paper I have reflected on a transition design project with the Dutch Government. This project revealed two challenges that were not factored within the design approach; (1) the *timing* of the transition relative to the surrounding environment and; (2) the *velocity* at which a transition could be fully enacted. I inquired into change and growth theories in order to understand how to manage the complexities of leading transitions by design. Theoretical implications act as platform for explorative and reflective practice that continues fostering the maturity of transition design as an emerging methodology.

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On transforming transition design: from promise to practice

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We are living in transitional times. Much has been under debate on the need to change and to cope with societal transitions, less emphasis, however, is devoted on how to do so. Therefore, one of the primary questions in Transition Design is *how to design for sustainable transitions*? The current work aims to evaluate 'transition design studies' by analysing and evaluating the current available practice of transition design in order to contribute to the field in two ways: first, by maturing through evaluation, and second, by identifying points of further research. Our findings show that three phases can be distinguished within transition design processes: *Design research* to understand past, present, and to envision the future; *Designing interventions* to create the right thing, at the right place, at the right time, and *Design practice for transition* that accumulate the design interventions in order to drive societal transitions.

Keywords: Design methods, persistent problems, sustainability transitions, systemic change, transition design

Introduction

Current transitional times are often referred to as the *Anthropocene*: an epoch caused by human activity, as opposed to a natural process. Crutzen and Stoermer (2000) explain that "*Human activities are exerting increasing impacts on the environment on all scales, in many ways outcompeting natural processes*". Even though, the concept of the Anthropocene has been well-motivated, many people have difficulties in accepting both the concept and the consequences. The corresponding objection towards the Anthropocene is causing social tension, trivialising this topic to a rather normative debate skewed by beliefs and values, rather than a scientific debate about evidence and explanation (Steffen, Grinevald, Crutzen, & Mcneill, 2011). Despite the trivialising of the topic and the endless debates, we *do* find ourselves in the middle of a global transition - with an outcome unsure, depending on how environmental, economic, and social *persistent problems* are resolved (Raskin, Banuri, Gallopín, Gutman, Hammond, Kates, & Swart, 2002). Persistent problems (Dirven, Rotmans & Verkaik, 2002) are the superlatives of wicked problems (Rittel & Webber, 1973). Differently put, persistent problems are the result of the flaws within our current economic and societal system, and can only be combated by fundamental change and the restructuring of our societal systems (Rotmans & Loorbach, 2008). The nature of persistent problems is extremely complex, due to their roots in different societal domains and the diversity of stakeholders (Rotmans & Loorbach, 2008).

Although the word *problem* is often associated with the word *solution*, for persistent problems this is not the case, due to their complexity. Persistent problems need to be broken down into digestible nodes, which can be addressed through the creation of smaller solutions, or interventions (Rittel & Webber, 1973; Rotmans &

Loorbach, 2008). The accumulation of those smaller solutions and interventions could lead to the transition of a persistent problem. Therefore, instead of solving persistent problems, we refer to *transitioning* persistent problems. A deep understanding of the system, the relations, and the components of the problem is required to do so. Transitions are understood as long-term, complex, and non-linear processes of systemic change (Mulder & Loorbach, 2018). In the current work, we refer to a more detailed explanation of transitions introduced by Rotmans and colleagues:

> *A transition is the result of developments in different domains. In other words, a transition can be described as a set of connected changes, which reinforce each other but take place in several different areas, such as technology, the economy, institutions, behaviour, culture, ecology and belief systems. A transition can be seen as a spiral that reinforces itself; there is multiple causality and co-evolution caused by independent developments. (Rotmans, Kemp, & van Asselt, 2001, p. 16)*

Due to the relevance and the urgency of persistent problems, the concept of transition has been widely discussed and broadly studied. Over the years, 'transition studies' has become an academic field (Escobar, 2015). In order to facilitate a new way of formulating and implementing policy for sustainable development in the short, mid and long-term, Rotmans and his colleagues have introduced the term 'transition management' to study transformative change processes in socio-technical systems (Rotmans et al., 2001; Geels, 2002; Kemp et al., 2007; Loorbach, 2010), resulting in a variety of frameworks and theories describing transformation and change. Geels (2002) developed a socio-technical landscape that depicts how transitions move through different abstraction levels of our society. Loorbach (2010) created the so-called transition management framework and cycle to make a distinction between different types of transition management, and what their functions are, and to bring this theory into practice. Werbeloff, Brown, and Loorbach (2016) studied what patterns transitions follow in order to understand how they manifest and move with, the aim to identify relevant and strategic agency opportunities. Through those theories and research, we seemed to have gained a lot of knowledge and insight in how transitions work: how they happen, in what ways they take shape, and how they are structured. Nonetheless, we have not found a way to structure, steer, or accelerate ongoing transitions. In other words,

> *We need to be clear that so far, transition management has been mainly implemented and conceptualised as a "shadow track" in which new visions, ideas, and agendas can be developed in a more innovative way than within the context of regular policy processes" […] "it leaves open for further research the fascinating question of how the basic ideas and principles underlying transition management could be translated into specific operational models that would be more in tune with other phases in policy- and decision-making processes. (Loorbach, 2010, p. 178)*

The severity of persistent problems and the urgency to address them, cannot be overstated. Although, this has been a topic of talk and research for years, fundamental change of the system has not occurred. There is little action to actively shape, control or guide this change. During the Climate Conference 2018, Greta Thunberg, a 15 years old girl from Sweden, nicely pointed out the problem to the UN: *"Until you start focusing on what needs to be done rather than what is politically possible, there is no hope. We cannot solve a crisis without treating it as a crisis"*. She correctly understood we have to move towards *action:* the growing severeness of persistent problems is accompanied by a growing *urgency to act*. This is where transition design comes to the play. Complementary to the transition management field, it aims to move *from understanding towards action*. Pointed out by Hughes and Steffen (2013), Jensen (2017) as well as Porritt (2013) there is a need for a new, design-led approach to address the complex, wicked problems confronting societies in the 21st century and to seed and catalyse societal transitions toward more sustainable and desirable long-term futures (from Irwin, 2018). The next section elaborates upon the role of design in transition studies.

Transition design

The design discipline has successfully evolved itself into a profession that addresses business and social issues with the use of design principles. Now, the design discipline is researching and experimenting how it can evolve itself into a discipline that is able to address complex persistent problems and to transform society, under the flag *transition design*. Transition design aspires to become an integrated discipline with a variety of knowledge and skills, that acts as an agent to facilitate, accelerate, and steer transitions. It is unique in its design-led approach and the ambition to integrate frameworks, processes, tools, and methods from a variety

of fields. This discipline emerged from the Carnegie Mellon University around 2011: Irwin and her colleagues explain the philosophy of transition design as following:

> *Transition Design advocates the reconception of entire lifestyles, with the aim of making them more place-based, convivial and participatory and harmonizing them with the natural environment. Transition Design focuses on the need for 'cosmopolitan localism', (Manzini 2009; Sachs 1999) a lifestyle that is place-based and regional, yet global in its awareness and exchange of information and technology. Everyday life is viewed as a potentially powerful, transformative space (Lefebvre 1984; Gardiner 2000) where transition designers explore ways in which basic human needs are satisfied locally, within economies that exist to meet those needs (Max-Neef 1992; Illich 1987; Kamenetsky 1992). This is in contrast to the dominant economic paradigm that is predicated upon unbridled growth and an imperative to maximize profit (Korten 1999. 2010; Mander 2012; Douthwaite 1996). (Irwin, Kossoff, Tonkinwise & Scupelli, 2015)*

Further elaborating upon this philosophy, Boehnert, Lockton and Mulder (2018) sharpen the role of *design* in transition design in their editorial for the recently organised Designing for Transitions track held at the Design Research Society conference in June 2018:

> *Whether considered in terms of everyday social practices, at a community scale or at the level of global challenges, a framing around designing for transitions brings together considerations of temporality, futures, different types of literacies, participation, social innovation, human needs, and interconnectedness; **designing for transitions involves designing how transitions are conceived, enacted, governed and managed**. (Boehnert, Lockton, & Mulder, 2018, p. 892)*

Clearly, the role, the value, and potential of transition are well-defined and explained, as the design discipline is paying more and more attention to transition design. The topic is addressed in academic literature and conferences. Nonetheless, and more importantly, just a very limited of number of academic case studies can be found that carried out and validated methods and tools, and thereby the potential of transition design. As the purpose of transition design is to *thrive action*, the (academic) focus of this discipline should shift towards development and validation of methods, tools and the potential of transition design through experimentation. Note that this does not rule out the variety and value of projects carried out on local, national or business level in the theme of *transition:* it is rather a critical note that in order to further develop the academic field of transition design, scholars should focus on analysing and evaluating those cases. Development of the academic field might also increase the value of non-academic projects, as it allows to move from random experimentation and trial-error process, towards a structured process and best practices.

In order to move from theory to practice, the current work aims to evaluate the transition design *practice* by analysing and evaluating the current available practice of transition design. The goal is to evaluate *how* and *where* the field can mature, to specify in more depth *what* should be developed, and to propose from *which* disciplines and practices, transition design can draw inspiration from that can contribute to achieving its ambitions.Method

First of all, it is important to note that *transition design* is a relatively new discipline, and the term *transition design* is not a specific term particularly used for the transition design field. The other way around, *transition projects* are not always carried out under the flag of transition design. This makes a researching this field tricky and fuzzy (Werbeloff et al., 2016). This study aims to *evaluate established practices of the transition design field* based on academic case studies that use transition design methods, tools, and frameworks as we aim to *map* and *evaluate* this specific discipline. Consequently, an online search strategy using the term "transition design", has been carried out. However, the search term "transition design" did not result into much results for the reasons explained above. Therefore, additionally the terms "design for sustainability", "design for systemic change", and "design for social innovation" are researched in order to find *case studies that do use transition design methods, tools, and/or frameworks.* Those terms are chosen based on a framework, created by Gaziulusoy in 2015, that visualises linkages, overlaps, and complementarities between different Design for Sustainability approaches. In this framework, Design for Systems Innovations and Transitions, evolves from and overlaps with systemic design, social innovation, and design for sustainability.

The search has been applied twice; once, broadly through google scholar, and once, limited to three leading design journals, i.e., Design Issues, Design Studies, and Design Philosophy Papers. Alongside this literatures search, the emerging design field has been studied by reviewing the themes addressed in recent call for papers

announced on the websites of well-known international design conferences, i.e., European Academy of Design 2017 (EAD12), Design Research Society 2018 (DRS2018), and Relating Systems Thinking and Design 2018 (RSD7). Publications meeting the following inclusion criteria are analysed: academic work that carries out a case-study with real users in order to test proposed frameworks, processes, and tools *developed for transition design*. This analysis has been done by structuring the frameworks, processes, and tools in a table (see Table 3). More precisely, each step or phase of a particular method found, the goal(s) of the step, how this step is carried out and the comments on those steps have been extracted. In this way, an overview of the available methods and their relation towards the step and goal has been created.

Results

The current section presents the results of our review, and is structured as follows. First, results following our search strategy are reported, presenting findings from the literature research and design conference calls, respectively. Next, the found frameworks, processes, and tools meeting the inclusion criteria are described.

Results: literature

Table 1 shows the results of the online literature research found via google scholar, and in the three design journals, Design Issues, Design Studies, and Design Philosophy Papers. A total of almost 13 million papers have been found (n= 12,908,889); 288,889 publications were found in the three journals, and 12,620,000 via google scholar. However, from this abundant number of hits, just a small amount of those papers is related to the transition design field, which has been concluded based on the title, and scanning the abstract from those papers. Through this online research, no publications meeting all inclusion criteria have been found.

Table 1 Results of literature review through google scholar and design journals

Searching engine	Terms	Results
Google scholar	"transition design"	n=5,970,000
	"design for sustainability"	n=3,200,000
	"design for systemic change"	n=3,450,000
		Total result google scholar n=12,620,000
Design Issues	"transition design"	n=11
	"design for sustainability"	n=112
	"design for systemic change"	n=45
total results		n=168
Design Studies	"transition design"	n=268
	"design for sustainability"	n=264
	"design for systemic change"	n=66
total results		n=598
Design Philosophy Papers	"transition design"	n=72
	"design for sustainability"	n=196,838
	"design for systemic change"	n=91,223
total results		n=288,133
		Total result journals n=288,889
		Total result journals & google scholar 12.908.889

Interestingly, the results show that the field of Transition Design is emerging, as relevant papers start being published from 2015 onwards. The work by Ceschin and Gaziulusoy (2016) explicitly indicate that the first, and only three, PhD's on the topic have been completed recently; Ceschin in 2012, Gaziulusoy in 2010, and Joore in 2010. The results also show the field is gaining attention within the design discipline: "Transition Design" (Kossoff, Irwin, & Willis, 2015) and "Transition Design Provocation" (Irwin, Kossoff, & Tonkinwise, 2015) are the second and fourth most read articles from Design Philosophy Papers. Furthermore, Ceschin and Gaziulusoy (2016) pointed out that transition design is also getting attention in the design education, as a group of scholars (Irwin, Tonkinwise, & Kossoff, 2015) has developed a curriculum on what they call transition design for the first time.

Results: design conferences

Our search in call for papers of recent design conferences confirmed the increase in attention for the transition design field: the European Academy of Design 2017 (EAD12), Design Research Society 2018 (DRS2018), as well Relating Systems Thinking and Design 2018 (RSD7) included transition design related tracks in their conference program. Table 2 provides an overview of the tracks and proceedings that are based on the field transition design.

Table 2 Results of design conferences search

Design conference and title	EAD12, 2017 "design for next"	DRS2018, 2018 "catalyst"	RSD7, 2018 "Challenging complexity by systemic design towards sustainability"
Transition design relevant tracks	- Design for next economy - Design for next environment - Design for next society - Design for next thinking	- Designing for transitions	- Models and processes for systemic design
Hands-on design practices included in conference proceedings		The Emerging Transition Design Approach	Systemic design toolkit

Results show explicit mentioning of the topic "transition design" in the DRS2018 track "designing for transitions". In EAD12 and RSD7, the topics "design" and "s*ustainable transitions and futures"* were combined in tracks, but *transition design* was not explicitly mentioned. Through this research, two interesting results are found. From the proceedings of DRS2018, an elaboration and pilot of the emerging transition design approach by Irwin and colleagues (2015) has been found. The proceedings of RSD7 refer to the Systemic Design toolkit (2018) developed by Namahn (Belgium human-centred design agency) and shiftN (futures and systems thinking studio from Brussels). Both propose a framework, method and tools specifically aimed at *designing transitions.* However, only for Irwin's framework a publication that meets the inclusion criteria has been found. This publication has been selected for a further, and more in-depth analysis on design methods, which is elaborated in the next section. As the further analysis consists of only one case-study, The Systemic Design Toolkit is used in the discussion complementary to Irwin's framework, for a synthesis and evaluation of the transition design practice. These two results are in the remainder referred to as Irwin's framework and the Systemic Design toolkit.

Results - analysis of the Transition Design Framework and Approach

Since 2014, the Transition Design Framework and Phased Approach developed by Irwin and colleagues, has been integrated into programs and curricula at the Carnegie Mellon University's School of Design. A first case study entitled "*The Emerging Transition Design Approach"* that applies this framework and approach has been presented at DRS2018. In this paper, Irwin (2018) evaluates the use of the framework and approach based on

one case-study. Table 3 shows a further analysis of this transition design framework and approach with a particular focus on the design methods used.

Table 3 Transition design framework & approach analysis (* these references can be found in Irwin (2018))

Step	Goals	How	Comments
1. Reframing present and future	1.1 Mapping the problem in the present *(creating the big picture)*	Stakeholder groups collaboration *(co-creation sessions)* Visual map *(visualization)* Identifying relations in map *(structuring the problem)*	Participants believes to be 'true' where challenged Process fostered empathy between stakeholder groups From 'confrontational' to 'co-creation' through discovery and playfulness
	1.2 Mapping stakeholders concerns and relations *(form individual perspective towards collective perspective)*	**No design methods** From other fields Needs-Fears Mapping (Wageningen University 2017)* Conflict Analysis Tools (Mason and Ruchard, 2005)* Multi-Stakeholder Processes (Hemmati, 2002)*	**Lack a component of action** Made people aware of their own cultural norms, beliefs and assumptions Prepared participants for future visioning by shifting their mindset
	1.3 Future visioning *(Envisioning and prototyping possible and preferable futures)*	Snapshots from 2050 *(narrative)* Create a worldview: first in small groups, later with whole group *(method 1:4:all)* Backcasting to create transition pathway *(backcasting and roadmapping)*	Showed there is much more room for solutioning when we think outside our paradigm, and this also unites different stakeholders **Backcasting to make things concrete is highly challenging and there are not enough tools and not a structured process to do so**
2. Designing interventions	2.1 Looking up and down systems levels in space, backward and forward in time *(discovering intervention points)*	What specifics of everyday life and individual practices contribute to the problem? *(user insight)* What current, large scale events, situations or trends contribute to the problem? *(trend analysis)*	Nothing indicated on how to do this
	2.2 Situate interventions aimed at transitioning the system toward the preferred future *(intervention design)*	Acupuncturists needles metaphor: situate the interventions at points they start to move things *(formulate design goal, design of intervention)* Amplifying projects (Manzini, 2015)*: look for what is already working at the grassroots level in order to support and amplify these efforts *(connect projects to vision)*	A table with design disciplines that are useful for intervention design is provided
	2.3 Multiple interventions at multiple levels of scale over multiple time horizons	**No design methods used**	The reaction of the system cannot be predicted The more complex the system, the more unpredictable the response
3. Waiting and observing	3.1 Observation and reflection in order to understand how the system has responded to the perturbation	**No design methods used**	-
	3.2 Shift in mindset and posture (and paradigm) from 'fast thinking and designing solutions' to 'long-term thinking'	**No design methods used**	-

Results show that step 1 and step 2 have a good foundation of design methods and processes. Regarding step 3, the goal has been defined, however, there are no design methods indicated or used in the case-study. For step 1.2, mapping stakeholders' concerns and relations, there are no design methods. Here, methods from other fields are borrowed. Although it is mentioned that these borrowed methods lack a component of action; this did not stop or withhold the process. In step 1.3, it is addressed that backcasting with a big group of stakeholders is highly challenging. However, this phase lacks the tools, methods and processes to support the intentions of the phase, and this is where the project starts to drift. For step 2, the goal and an indication of methods that can be used to reach this goal are defined - but as there is no plan of action made in step 1, it is difficult to situate the interventions in step 2.

Discussion

Results of our search strategy on transition design practices indicate a growing interest in this emerging discipline. Although the increased interest in the design discipline appeared promising, our findings show little evidence to fulfil the promise: only one publication that meets the inclusion criteria, has been found. In other words, only one academic publication has been found that carries out a case-study with real users in order to test proposed frameworks, processes, and tools *developed for transition design*. This might be due to the fact that we deliberately used the phrase "transition design" and "transitions", which rules out studies from other fields, that using different terminology but might bring relevant contributions to the methodological practices in the transition design field. However, as argued, the current work aims to specifically map practices that have been developed under the flag of transition design. For further research, it would be interesting to include those studies and to evaluate how other disciplines can contribute to the development of the transition design practice.

Furthermore, the framework and approach by Irwin (2018) has been based on principles and consequently, remains rather abstract: until today, only one case study of application has been published. There is no indication found regarding the impact and performance of transition design practice. In the remainder of this section, we elaborate upon how Irwin's framework and the Systemic Design toolkit can address the limitations of transition design field referring to limitations earlier identified by Ceschin and Gaziulusoy (2016). Although the Systemic Design toolkit did not meet the inclusion criteria, we choose to use it as an example for the synthesis of the transition design practice. The limitations identified by Ceschin and are Gaziulusoy (2016) are: on the one hand a too big picture approach, and on the other hand a lack of actionable components. Consequently, ways to address the discrepancy between macro- and micro-innovation are discussed. Based on a synthesis of the transition design framework and approach (Irwin, 2018), and the Systemic Design toolkit, three transition design phases are proposed: *Design Research*, *Designing Interventions* and *Design Practice for Transition*. According to this synthesis, each phase can be linked to one of three limitations earlier mentioned (Ceschin & Gaziulusoy, 2016). The found methods for each phase, referred in the transition design framework and approach (Irwin, 2018) are listed. Based on this overview, each phase is evaluated and suggestions for further research are done. The results of this synthesis can be found in Table 4.

Table 4 Synthesis of the transition design framework and approach (Irwin, 2018) and the Systemic Design Toolkit (2018)

Transition Design Phase	Design Research	Designing Interventions	Design Practice for Transition
Indicated limitations transition design by Ceschin & Gaziulusoy (2016)	*Too big picture*	*Linking macro- and micro innovation*	*Endorsement*
Steps and methods in Framework	1. Reframing present and future - co-creation sessions - visualization - relation-mapping - use of narratives - 1:4: all - backcasting and roadmapping	2. Designing Interventions - locate the spots for design interventions in the system - create multiple interventions at multiple levels over multiple time horizons	3. Waiting and observing
Steps and methods in Toolkit	1. Framing the system - rich context template	5. Exploring possibility space - intervention strategy canvas	
	2. Listening to the system - actants template	6. Designing the Intervention strategy - connectors template - paradox cards	
	3. Understanding the system - system map template	7. Fostering the transition - roadmap for transitions template	
	4. Defining the desired future - value proposition template		
Total	*Framing present: sufficient tools and methods*	*Designing interventions: sufficient methods and tools from other design fields*	*Monitoring and steering: no methods*

Design Research: how to escape time and land in space?

This phase is about researching, structuring and understanding the past, present and future context, and the stakeholders, of the problem. This research phase should lead to new insights that are used to create a vision on how to address this problem. Therefore, we refer this particular phase of a transition design process as Design Research. Both Irwin's framework (2018) and the Systemic Design Toolkit (2018) partly address the apparent limitation, too big picture, for this phase. Both the framework and the toolkit seem to be equipped to create an understanding of the past and current situation and to frame the problem, using design methods; as can be found in Table 4: step 1 in the transition framework, using stakeholder co-creation sessions, visual maps and connecting and structuring in this map. Step 1 to 4 in the Systemic Design Toolkit: using the rich context map, actants, system map, and value proposition. However, both the framework and the toolkit are not equipped with design methods to help users think outside their own paradigm in order to create a novel future vision. There is agreement that the novelty and quality of a shared vision guide and determine the success of innovation processes in business (Pearce and Ensley, 2004). Considering transition design as a large scale, multiple stakeholder, radical innovation trajectory, the novelty and quality of the future vision is crucial. Further research on methods, tools and processes to create future visions are welcome to mature the transition design discipline. Lessons from strategic design and radical innovation can be a first step for further research.

Another limitation found in the *Design Research* phase, is the lack of design methods for the management and leveraging of stakeholders and their interests. Irwin (2018) borrowed methods from other fields (see Table 3, step 1, goal 1.2), and motivate that those methods are useful to gain insight, but they lack a component of action. To understand the involved stakeholders and the discrepancy between their interests, the Systemic Design Toolkit created the 'listening to system' method. It considers the perspectives of the stakeholders on the issue, and it provides a visual tool to show the points of discrepancy between the stakeholders within the situation. Unfortunately, this canvas is made to compare the perspectives of only two stakeholders. Persistent problems have a great variety of stakeholders (Rotmans & Loorbach, 2008), and therefore this canvas is not extensive enough for addressing those problems. A first step to address this limitation might be expand the tool 'listening to system' in such a way it allows for use with multiple stakeholders. Another step could be researching the used methods by Irwin and collages, to see if they can be transformed towards design methods.

Designing Interventions: the right thing, at the right place, at the right time?

The current phase is about moving from vision towards action by creating the right intervention, at the right place, at the right time. In our work, we, therefore, refer to this phase as Designing Interventions. Both the framework and the toolkit propose a method to find the right place and time for the intervention; as can be found in Table 4: step 2 in the framework: locate the spots for design interventions in the system, create multiple interventions at multiple levels over multiple time horizons. Step 7 in the toolkit, roadmap for transitions. To create the right thing, the framework provides a table with other design disciplines that can be used to create interventions; the toolkit developed step 5 (the intervention strategy canvas), and step 6, (the 'connectors' and the 'paradox cards') to design interventions. An interesting observation is that the framework starts this phase by looking into the whole system and the planning of design interventions; the toolkit starts by creating solutions and then continues to planning. Unfortunately, the framework provides little structure or tools to find the right time and the right place, and at the same time, to create the right intervention; or in other words, how to link macro and micro innovation. To link innovations, the toolkit created the roadmap for transitions. This helps to place the interventions in time. However, this canvas is not extensive enough to find the right place, as it does not consider the complexity and different levels of the transition context - or in other words, it is not extensive enough to link macro and micro innovation. For further research into how to link macro and micro innovation, it might be interesting to start with combining the 'locating' of the framework and the 'roadmapping' of the toolkit. It might also be interesting to look into product portfolio management and product development from a strategic design perspective, as they consider careful planning the timing of launching new products, and how the products relate to each other.

For the designing of interventions, step 5 (The 'intervention canvas') of the toolkit provides a good bedrock as it clearly structures the boundaries of the system, and step 6 (the connectors and the paradox cards) are useful probes to further develop and define the interventions. Thereby, it provides sufficient guidance on how to create the right thing. The framework suggests a table with design disciplines that are experienced with the

design of interventions, which should give sufficient guidance in designing interventions, as those design disciplines are matured and capable of creating good designs. A first initiative to further develop this step, might be to create a separate toolkit for the design of transition interventions, including methods from other disciplines.

Design Practice for Transition: from parts to sum

Transitions are understood as long-term, complex, and non-linear processes of systemic change (Mulder & Loorbach, 2018). In other words, by accumulation of small happenings and changes, or planned interventions, a non-linear transition of systemic change is effectuated. If we facilitate and steer this non-linear process, by making the parts, thus the several design interventions into a whole, and so enable an accumulation, design can contribute to the transition. In keeping with the promise of transition design, this can be achieved with the use of design methods. Therefore, we coined this third phase as Design Practice for Transition. As can be seen in Table 4, nor the framework, nor the toolkit propose a structure, method, or tool, to do so. The framework suggests the phase "waiting and observing" without any further elaboration. Clearly, this phase lacks components of action, which is in keeping with the limitations Ceschin and Gaziulusoy (2016) indicated. However, the difference between design interventions and transition design is the ability to tie interventions together towards one goal. Therefore, further research on how to make a sum of the parts is needed. On top of this, it is important to develop ways to measure the effect of design interventions to get insight on their effect, so we steer the non-linear process in the right direction.

For further research on this matter, it seems to be interesting to learn from the lean startup philosophy and principles. "The Lean Startup method teaches you how to drive a startup: how to steer, when to turn, and when to persevere - and grow a business with maximum acceleration" (Ries, 2011). Considering this "learning to drive a start-up" as a non-linear process, which constantly fundamentally changes direction, transition design can be seen as "learning to drive an extremely complex, invisible vehicle", and can learn from a good start-up drive-lesson.

Conclusions

The current study presented the results of a review study that particularly searched for publications, studies, and other material demonstrating practices of transition design. Based on the search results, an analysis and evaluation of transition design has been presented. This research is limited to the particular field of transition design practice, and rules out the variety and possible contributions from other fields and/or projects that are not written up in an academic literature format. For further research, it is recommended to study a broader spectrum of the academic field, as well as the non-academic field exemplifying a "transition approach". Nonetheless, the current research resulted in a proposal of a new transition design process consisting of three phases, and provides suggestions on how those phases can be further developed. The first phase, design research, is about researching and framing past, present, and future with the end goal of a deep understanding of the situation and a shared, novel future vision. This phase is equipped with various methods to understand past and present, but thin on methods to envision the future. Further research into how for example strategic design and business develop future visions seems to be promising. Phase two, designing interventions, is about creating the right thing, at the right place, at the right time. For this phase, there are available methods and steps that guide how to do so; however, those methods and steps do not provide sufficient support to link macro- and micro-innovation. For the design of interventions, a great variety of knowledge from other matured design disciplines can be used; but it would be interesting to further research if a *design interventions for transitions toolkit* can be developed. The last phase, Design Practice for Transition, is both the most important phase as the less developed phase of transition design. For further development and maturing of the transition design field, it is of great importance to further research and develop methods for this phase. Learnings from for example the agile philosophy, aiming to guide innovation based on a build-measure-learn approach, might be an interesting starting point for this phase.

In conclusion, there is great relevance and need for transition design in transition studies, as it aims to move from understanding towards *action*. Unfortunately, until date both fields demonstrate little knowledge about the effect and implementation of those new disciplines in practice, and consistently end with a – unfulfilled – promise. To further develop the academic field, the emphasis should lie on testing and developing the frameworks, tools, and methods for transition design as well as measuring and monitoring the effect of this

approach in the real world. Through its implementation, transition design can come to life and move from an inert promise to a discipline that drives action and enables transitioning forward to a sustainable future.

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Personal, political, professional: a practice in transition

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It is widely agreed that in order to contribute to transitions towards sustainability, both practitioners and design itself must also transition. This paper presents findings from the first two years of transition in my Australian-based design practice. The paper explores what this transition has required of me personally, politically, and professionally, and draws on cases from my PhD. The PhD and paper are both part of an analytic auto-ethnography of my practice's transition from 'making greener things' towards design for transitions. The projects discussed use ethnography, action research and reflective practices in their temporal approaches. This paper explores how slower methods such as transition design and autonomous design can extend the political reach of a design practice and discusses sacrifice and the financial stabilisation that comes from enveloping old practices within the new. The analysis presented here also reflects on my experiences practicing design for transitions and on data collected through participant engagement.

Keywords: transition design, practice transitions, transformation, designer politics, power

Introduction

Humanity has exceeded multiple planetary boundaries (IPCC, 2018) and it is increasingly evident that significant changes are on the horizon. Whether these changes are by choice or by force depends upon immediate and collective actions being taken to mitigate climate change. Design is uniquely positioned to contribute to managed processes of societal change, and to make change desirable (Boehnert, 2018; Fry, 2009). In order to do so, design itself must change—from a practice entangled with the economic pursuits of business, to one that is focussed on transitions toward more just and sustainable ways of being in the world. As part of this endeavour designers will need to craft rich narratives for sustainable futures (Lockton & Candy, 2018) and these visions will reimagine everyday life. This permits designers to consider how their daily labour could be redirected as transition design; but in this reimagining of everyday life, consideration must also be given to what work/labour for non-designers looks like in transitions towards sustainable futures (White, 2015). Visions of a sustainable everyday will require a granularity that allows rich interpretations of how these possible futures might function, particularly if they are to offer viable alternatives to the dominant neo-liberal narrative in the West. This paper explores the practice of transition design and reflects on the first two years of a research-led, practice-based transition.

A design practice in transition is many things at once, often making it ill-defined and impeding the clarity of its brand narrative. These in-between times can be challenging due to the ever-present tension from blending the old practice and the new. The sometimes-paradoxical mix can result in a practice that feels at odds with itself; doing commercial work can feel 'wrong' but conversely it helps fund the transition work that feels 'right'. This paper discusses these tensions, the navigation of pain points, and the personal, political and professional

commitments I have made as a practitioner while transitioning my design practice from a commercially-focussed sustainable design practice of 'making greener things', towards a practice that designs for transitions.

The reflections presented are underpinned by theories of change, power, social practices, consumption, and complexity, as well as data collected as part of a larger PhD research project. It should be acknowledged that this paper and my broader transition have been influenced by supervisory guidance provided through my PhD. The projects referenced in this paper are part of this PhD and my Australian-based design practice. Due to the temporal nature of transition design most of these projects are ongoing, and likely to continue for years to come. The 'unfinishedness' in transition design case studies poses a relative challenge in their presentation, so perhaps (at least for this paper, if not for transitions as a whole) the discussion of case studies is better thought of in a continuing sense, as case studying.

Personal transformation and the commitment to a practice-based transition

Transition design literature argues for an altered mindset and posture in designers, shifting the designer from a competitive space into a cooperative one (Irwin et al., 2015). This appears to be a crucial step for practicing transition design, which is highly collaborative in its approach. Drawing heavily on participatory processes such as co-design, ethnography and facilitated stakeholder engagement, transition designers also benefit from personal virtues such as deep listening, patience, generosity, flexibility, empathy and resilience (Irwin, 2015, p. 23). In Escobar's descriptions of autonomous design, these collaborative processes are described as existential or 'life's work' (Escobar, 2018 p. 184-185). They are performed by designers embedded within communities who facilitate space for the co-definition of problems and the co-design of solutions that meet communal visions for the future (Escobar, 2018 p. 184-185; d'Anjou, 2015). Both autonomous design and transition design are reliant on collaborative processes for their success, and require an understanding of power dynamics (Boehnert, 2018; Escobar, 2018; Lukes, 2005) and of the power relations present in group dynamics (Dahle, 2018; Gee, 2011) in order to practice with sufficiency (Avelino, 2016; Dahle, 2018; Willis, 2015). Reflection on literature discussing power and behaviour dynamics brought with it a greater sense of my own power and privilege, and the role this is playing in re-forming my identity as an empowered designer is significant. My PhD research exploring consumption and waste catalysed further change and empowerment. Adopting a zero waste lifestyle formed part of a personal ethico-political stand against consumerism (see figure 1)—a change that became more meaningful after its extension into my practice. In making the commitment to transition my practice and refocus its outcomes in line with this, the immediate question of 'how?' came to the fore. Decelerating consumption is not a principal concern for the design industry or its symbiotic partner-in-crime, business, so how can a designer perform the work needed for a post-capitalist society if practicing design is currently made financially viable through its active participation in a consumer society? What sacrifices must precede the rewards that could follow?

There is a complicated tension that arises from a disconnect between personal empowerment and professional actions. Sub-conscious responses to this tension could present as cognitive dissonance, leading to denial and a subsequent action paralysis (Boehnert, 2018 p. 135-142). Deeper cognisance of this tension can put designers in a double-bind. Double-bind theory stems from social psychology; it describes how schizophrenic symptoms can result from no-win situations, where complex and contradictory messages prevent action (Bateson et al., 1956). Designers can experience a double-bind when they view sustainability as simultaneously necessary and impossible in the context of their design brief. The resulting action paralysis can lead to design's equivalent of business-as-usual—an aesthetically pleasing range of unsustainable design outcomes. In contrast, a designer who transforms their relationships to ecology and the problems that threaten it becomes empowered to politicise their approach. Deeper
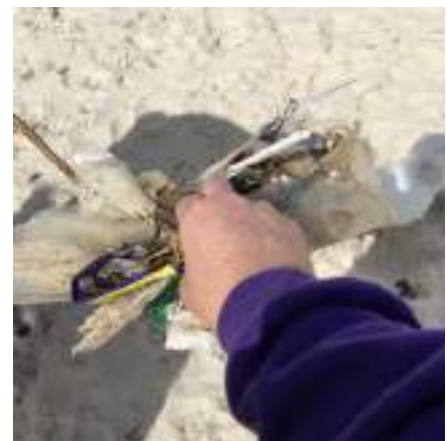
Figure 4: (Top) Daily litter collection as part of the political action against waste. (Bottom) The landfill waste produced during the first two years of my zero waste transition

engagement with problems and contexts through transformative and epistemic learning can create a kind of stickiness to theories presented in the literature which can forge pathways to action (Sterling, 2011). This shift from knowing into doing activates the ethico-political designer. This awakening can illuminate the sustainable potential in a brief, in turn loosening the double-bind causing action paralysis. It would appear that the rich experiences that formulated my transformation have sparked a mindset and posture shift which in turn facilitated the emergence of transition within my design practice. An ethico-political commitment fostered a praxis that catalysed a powerful practice-based transition—from designing 'greener things' towards designing against consumption through transition design.

Design against consumption: the intersection of personal and practice transitions

It is widely understood that the problems of consumption and waste are connected, but less frequently recognised that both are accelerated and reinforced by design (Jackson, 2006; Thorpe 2012). Like so many of the sustainability problems we face, the problems of consumption and waste are also structural in nature, and the design industry's technical approaches—including designing 'greener things'—tend to reinforce rather than resolve these problems. Approaches such as cradle-to-cradle design (Braungart & McDonough, 2010) present valuable changes to the use and circulation of materials as part of a circular economy, but simultaneously fail to address design's acceleration of consumption (Boetzkes, 2016). Cradle-to-cradle aims to make 'good' things but its myopic consideration of design as an accelerant of consumption results in a default position of "making consumerism 'better'" (Thorpe, 2010 p. 15). Case in point: compostable single use plastics. This intervention 'improves' the materials of single use items but reinforces the culture of convenience and disposability underlying this waste stream. Furthermore, compostable plastics reinforce other wicked problems such as monoculture farming, decreased soil health, biodiversity loss and declining pollinator numbers. This well-intended solution demonstrates how complex sustainability problems are, how critical designers must be in our approach to technofixes, and how deeper relational thinking is required from designers working in this space.

Mapping processes in transition design (see examples in figures 2 and 3) are part of the framework's 'new ways of designing' (Irwin et al., 2015) which practice critical thinking and systems thinking. Pattern sensing during the analysis of complex data practices relational thinking (Dahle, 2018).
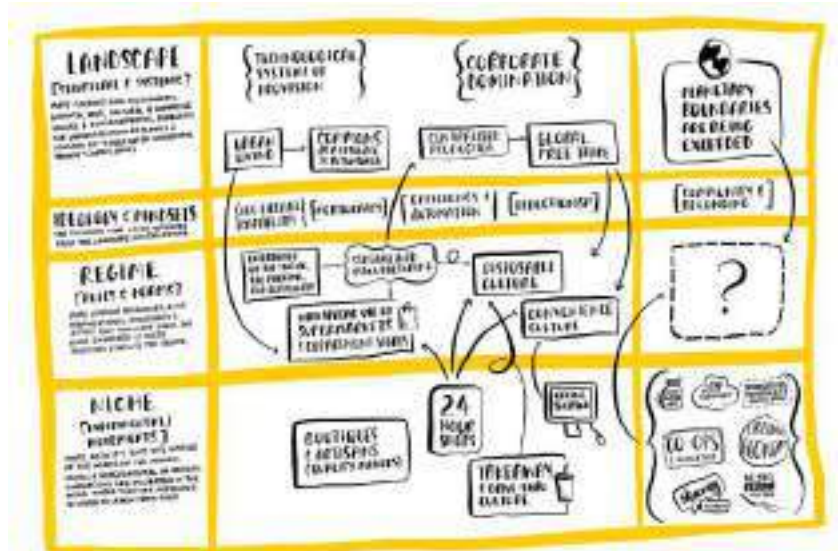
Figure 6: Making ideologies and mindsets visible in the MLP: mapping social practices in consumption as part of the Rethink Rubbish project from a PhD
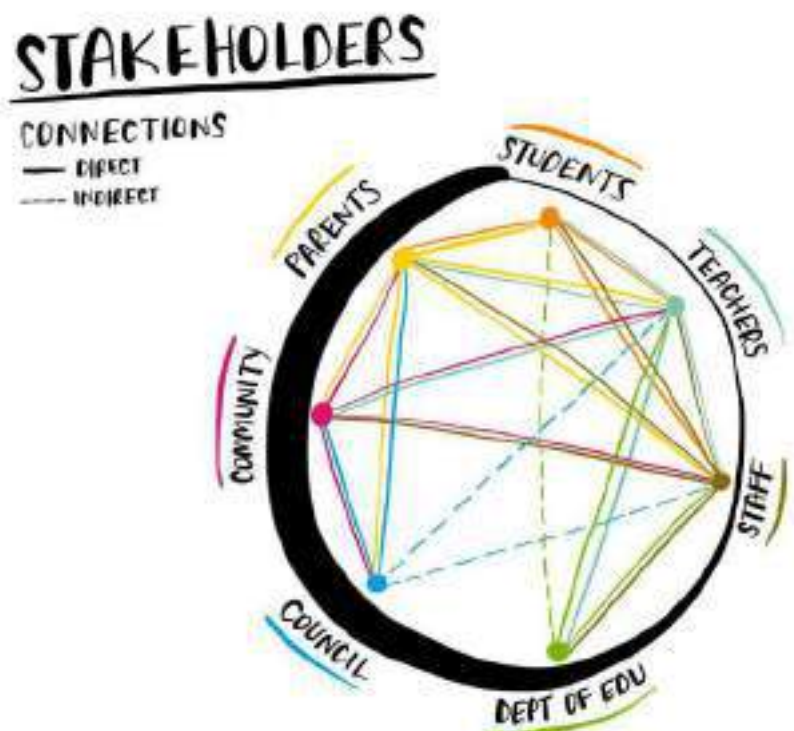
Figure 5: Mapping stakeholder group connections, from the Rethink Rubbish project as part of my PhD

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These mapping processes and thinking techniques provide valuable insights into the approaches that might be needed in order to design against consumption, and when combined with theories of change such as socio-technical regime theory (Geels, 2002; Geels & Schot, 2010), designers can analyse historical shifts in social norms and gain insights for possible future transitions. Figure two (above) analyses consumption's history as a social practice by adapting Geel's (2002, 2011) multi-level perspective (MLP). It presents a narrative for the impact of the economic paradigm embedded in neo-liberal capitalism and reveals how a combination of changes made to production, manufacture and sale at the landscape (slow-moving) and niche (fast-moving) levels of a society can influence the everyday social practices that make up the norms of consumption, use and disposal at the regime level (stable-centre). Combining insights from mapping the MLP with Meadows' leverage points for system intervention (Meadows, 1999) provides a deeper understanding how and where structural change might be possible. This informs visions and backcasting, where ideation of design interventions starts in a future position and works back to the present (Lockton & Candy, 2018; Irwin et al., 2015). Mapping has been used in my practice for ideation (mind maps) research and prototyping (system/journey/experience mapping) but transition design's approach to mapping and analysis spanning wicked problems/interconnections, stakeholders, and their visions, is a 'new way of designing' within my practice (Irwin et al., 2015). These mapping processes have enriched the collaborative approaches being undertaken, illuminating previously unheard perspectives and creating a richer and more dynamic understanding of the problems to be solved. Using collaborative mapping and ethnographic data collection techniques in considerations of the consumption and waste problem has revealed cultural differences in people's relations between consumption and waste. Project analysis for *Rethink Rubbish* reveals culturally visible virtues of respect and responsibility appear to cultivate low waste behaviours more easily, and point to underlying values of care and compassion. Use of design interventions to awaken these values and encourage these virtues has been a key consideration in this project.

Designing against consumption is perhaps most challenging because post-capitalist narratives are absent from the bulk of Western society, yet it is evident that a compelling narrative for sustainable futures is required to enact transitions (Eisenstein, 2013; Irwin et al., 2015; Monbiot, 2016;). Looking to indigenous cultures and the Global South provides valuable insights into the power of community-based narratives (Escobar, 2018); these cooperative narratives are vastly different to the competitive narratives so prevalent in the West that accelerate consumption by encouraging a growth mentality. Notably, a very different relationship to consumption and waste is also prevalent where communal narratives are more dominant (Escobar, 2018); most likely arising from deeper ecological connections providing satisfaction separately from consumption that tend to be more prevalent in indigenous and communal cultures. There is much that can be learned from the Global South and indigenous perspectives when crafting new narratives during visioning exercises, particularly when developing the more granular details of a possible sustainable future. Figure 4 presents an early draft of a possible future narrative for *Flourishing Fleurieu*, a transition design project emerging in South Australia's Fleurieu Peninsula that explores this farming region's struggle with food security.

Figure 7: An early draft of a narrative being developed as part of the Flourising Fleurieu project that is exploring a transition from food desert to participatory food hub

The 'everydayness' of the problems being approached in transitions

Situating sustainability problems in the everyday also provides a granularity to our understanding of wicked problems (Kossoff, 2011; Kossoff et al., 2015). The aforementioned example of single use plastics points to this 'everydayness' in

the consumption and waste problems. Mapping these complex problems provides richer understandings of the complicated interwoven network of practices that hold consumer culture in place. There is a significant aspect to consumption that is socially constructed (Baudrillard, 1998; Jackson, 2006; Thorpe, 2012) but the 'everydayness' of contemporary consumption also operates outside of this construct. Baudrillard's (1998) suggestion that consumption is narcissistically driven by the desire to signify success or be perceived in a particular way is challenged by contemporary settings, where needs are satisfied through daily practices coupled with consumption (Manzini, 2006; Manzini & Walker 2008). This 'everydayness' defies Baudrillard's arguments of socially constructed signification, hierarchy, or status—aspects that are far more prevalent in conspicuous consumption than in the consumption of everyday items such as a bar of soap or a sandwich.

Consumption is often analysed as an economic or social function, and it has been argued that design acts like a glue that binds the economics and sociology of consumption together (Wallace, 2018). Analysing consumption with design's binding ability in mind provides some clarity on the impact of daily practices and reveals new possibilities for design interventions. Mapping the problem of consumption through daily practices reveals its all-encompassing nature; acts of consumption surround how we eat, how we bathe, how we communicate, how we transport ourselves and so on. There is an everydayness to the problem, and the coupling of practices with goods and services presents an opportunity to redesign consumption by detaching it from everyday practices. This is also recognised in Kossoff's 'Domains of the Everyday', where he identifies everyday practices as the locus for more sustainable modes of living (Kossoff, 2011). Changing the culture of our everyday practices—for example shifting from a disposable culture to a reusable culture—could dramatically reduce the impact of everyday consumption.

My personal transition to a zero waste lifestyle provides a lived experience that informs how I design interventions to the problems of consumption and waste. But moreover, its political endeavour has become an ethical guide for decision making in my practice. It is evident that the ongoing transformation of my daily practices continues to inform and facilitate the larger transition taking place in my design practice in what Escobar (2018) might describe as an 'onto-ethico-epistemic' political endeavour; it is existential in nature and as such cannot be neatly compartmentalised into personal or professional boxes, despite the attempt in this paper to do so.

Political shifts: from designer-consumer to designer-transformed

Political activation is a necessary part of transitioning, and politics are interwoven throughout design for transitions, however in this paper I posit the political quite intentionally between the personal and the professional, as a metaphorical bridge that connects one to the other. Literature from Boehnert (2018), Escobar (2018), and Fry (2011) discusses the politics of design as being a crucial component of design for sustainable futures, and reflection on several design projects from my PhD reveals the role of politics in empowering the praxis of sustainable transitions. I would argue that designers lacking political drive could be more inclined to live one way (sustainably) and work another (unsustainably), whereas a politically active and empowered designer holds greater potential to drive change through their work as a result of their personal values and beliefs. Furthermore, an inability for designers to recognise their political power subsequently limits their agency, and perceptions of power relations in the client-designer relationship can impede action. Recognising that action takes many forms, initially political acts in practice may take a verbal form (conversational/critical questioning) before being realised through a designer's work. The

Figure 8: Excerpt from a practitioner interview conducted as part of my PhD research

introduction of challenging concepts such as post-capitalist design can be limited in commercial practice (Boehnert, 2018); managing detachment from the economic priorities of the design industry could be key in the political activation required for transitions in design practice.

In his critical essay, *Edugraphology*, Papanek (1999) argues that designers are trained as consumers and I have called these designers 'designer-consumers'. I would further argue that while a designer-consumer can make anything desirable, they lack the required knowledge to design against consumption (see Figure 5). An education steeped in consumerism precedes emergence into an industry that requires the acceleration of consumption. Industry experience then reinforces the designer-consumer mentality, and the feedback loop between industry and institutions reinforces the designer-consumer approach in education. Following this argument, if the designer-consumer designs for consumption, what kind of designer designs against it? Designing against consumption can create a double bind for designers with a consumer mindset, rather it is what I call the 'designer-transformer' who performs in this space. Education in post-capitalist design is still lacking (and barely exists outside of a PhD) however deep engagement with theories of consumption, power, change and social practices leads to an expanded understanding of the culpability and capability of design. I propose that commitments made to shift daily practices, ways of thinking and approaches to design are all political acts that play a necessary role in a practice's transition, and combined can prompt more intentional moves towards transition design projects that lead to the emergence of the designer-transformer.

Professional: the ongoing process of transitioning and learning

The *Rethink Rubbish* project emerged from my zero waste transition, and in collaboration with primary school teachers explores a scaling up of a small and personal zero waste approach into classroom settings. This project drew insights from an earlier (failed) attempt at a disruptive/transition design project, *Encore*, that aimed to create a circular and sharing economy through a subscription service for fashion accessories. Whilst it was a great project to participate in, on reflection I was just a greener shade of designer-consumer and had not transformed enough as a practitioner to sufficiently contribute. The project was also impeded by street closures impacting its brick and mortar location, and timing-related setbacks that affected participant recruitment. Greater agility in reading the project and the participants and adjusting the approach accordingly would have been beneficial, but ultimately, I believe the collaborative team tried to do too much too soon. We did

Figure 9: Experiential provocations and emergent projects, from the Rethink Rubbish project as part of my PhD

not allow ourselves flexibility when we needed it, and perhaps as a group we did not understand the role that time plays in projects of this nature. I cannot help but wonder what would have happened had we explored this project with greater temporal-flexibility in mind? This was a significant learning opportunity in designing behaviour change as a slow process rather than a fast one. As my transition continues, I recognise how critical temporality is in designing interventions for transitions as opposed to standalone projects for pre-determined design briefs. Transitions involve shifting gears and what works in the fast-paced world of commercial design does not always translate into the slower pace of transitions.

Rethink Rubbish began with the aim to transition a school to zero waste through a series of workshops that explored the problems of consumption and waste through a number of experiential provocations (see Figure 6). The insights from each workshop informed approaches for the next cycle of activity, and a flexible approach to the workshop facilitation permitted greater responsiveness to the needs of the group at hand. Creating co-learning opportunities between class groups provided a dynamic way of communicating the zero waste transition to younger students, who responded well to learning from their peers. This also appeared to validate the project in their minds; one student remarked how the change seemed more achievable once they saw proof of another class's success. With *Encore's* lessons front of mind, bolstering the workshops with a significant allocation of open time also created space for student consultation and emergent projects.

Rethink Rubbish explores big change achieved through small actions, and the endeavour to address student behaviours around consumption and waste was more successful in some classes than others. Some students believed their individual behaviours were the key, some teachers felt that their classroom's proximity to the garden made a difference, and the data collected on the use of the zero waste jars suggests that those classrooms with an activated teacher/student who championed change were the most successful at minimising their waste. For the duration of 2018 all classes used a zero waste jar to keep their landfill waste visible, but there is still more work to be done to culturally embed this change. The project timeline has recently been extended and new possibilities have emerged from this additional time. A revised vision for the project shifts the school's aim from 'zero waste transition' to 'state leader in sustainability', and new projects are emerging that explore how connections to the curriculum could foster the continued teaching of sustainable life skills.

One such project aims to shift students from consumers to contributors by building connections between the classroom, the garden and the canteen (see Figure 7). Each class will plan, plant and prepare a meal for their peers, they will serve it to them and will later be in receipt of a meal that is planned, planted, prepared and served to them by another class group. The project draws connections back to the curriculum through traditional lessons such as math, economics, biology and life sciences all of which are contextualised in the garden and kitchen, and in the process, students will also learn sustainable life skills around food production and preparation while practicing reciprocity, cooperation, planning and project management. Student participation in experiential sustainability learning nurtures values of respect and care that could lead to lifelong pro-environmental behaviours (Holmes et al., 2011; Stern et al., 1999).

Figure 10: Connecting sustainability life skills into the curriculum. Sketch from the Rethink Rubbish project as part of my PhD

Throughout the *Rethink Rubbish* project I have used my voice and design authorship for political ends, and in turn my practice has continued to transition. I would argue that the project is an emergent outcome of my transition to zero waste and conscious consumption, and feedback from teachers and students revealed their belief that my behaviours inspired their transition. Being embedded in the school community and engaging with students regularly permitted greater transparency in my own behaviours, which unbeknownst to me were being carefully observed by the students. One student commented that she knew I really meant what I said because I always wore the same pair of earrings, the same sneakers and carried the same bag. To her, this was testament that I had been honest in communicating my own consumption habits. The project's success hinging on my own transformation is subjective, but upon reflection on the feedback from participants, I could argue that my demonstration of a zero waste lifestyle provided additional leadership for the changes occurring in the school. I posit that these findings show how a political shift from designer-consumer to designer-transformed can influence outcomes. Furthermore, this project's close ties to theory and its highly collaborative approaches have been key to the workshops' success, and to the identification of emergent projects that can help achieve the school's future vision.

Locating transitions in practice

Transition design is still largely academic and practice is in its infancy, particularly in Australia. In the US one well documented approach is underway, *Transition Ojai;* a joint venture between Carnegie Mellon University and FlipLabs that aims to build a community's resilience to climate change (Hamilton, 2018; Irwin, 2018). Much like *Rethink Rubbish* and *Flourishing Fleurieu*, the *Transition Ojai* project has benefitted from incubation in academia and practice. Conversations with designers attempting to practice transition design reveal how it is emerging in their work, and how distinct the challenges can be for employees. Designer-employees wanting to redirect their daily labour towards transition design could start by verbalising the need for transitions and by asking critical questions of their employers and peers. Power dynamics can play a significant role in stifling authorship in workplaces, and one designer's demand for greater criticality in the work and workplace reveals her practice of transition design faces a class-struggle. Idea counterpower is evident in research she conducted that interrogates how the company's product might be reinforcing marginalisation of minority groups. A kind of economic counterpower is evidenced in another designer's negotiation of mandatory time for transition design as part of her design agency employment contract. Another practitioner interviewed as part of my PhD research is still navigating the 'how', and feels they need further knowledge/training before their practice can truly activate. These stories reveal a practice is slowly surfacing outside of academia, and signify practitioners' commitments to making space for transitions, a curatorial process I believe has been key in my practice.

Curating space

What takes place in a transitioning practice could be described as a process of curation. In an art gallery curation involves careful planning and consideration of the interactions between works that share space, and the process bears similarities here. Creating space for the work of transition design to inhabit leads to the old practice becoming enveloped by the new. In this sense, transition design is less an adjoining camp to existing practice and more like a circle that is drawn around a practice, with consideration to what exists inside. Within its boundary live a number of things, each requiring space and attention to flourish. As the curation in my practice focusses on transition design this aspect of the practice will thrive, and in the process the old practice will recede. As with systemic change, transition design does not 'negate the old, but [rather it] contains and supersedes it' (Eisenstein, 2013 p. 38), and this notion of enveloping the old better communicates the changes taking place.

Figure 11: Curating space for transition design by enveloping the old with the new: this draft modelling concept is being explored as part of my PhD research

Curating this space has involved a process of letting go: of some clients, some projects, some thinking, however in doing so there has been no disciplinary divorce as such.

Practicing transition design does not negate my practice of communication or interaction design, rather it utilises my knowledge of both. It envelopes them, and changes how I think about them; their power is harnessed as part of transition design which continues to redirect their focus. Communication design as a redirected practice can make sustainable futures desirable (Boehnert, 2018; Fry, 2009) and post-capitalist applications of interaction design could support transitions (Tonkinwise, 2014). Eventually these redirected practices of communication and interaction design will simply form part of my practice of transition design, superseding their original modes of practice. As this transition continues, it is anticipated that a reliance on stabilisation funding from commercial projects will decrease as funding for community-based transition design increases.

The funding balancing-act is currently being explored through *Flourishing Fleurieu,* where a number of local circular economy food and farming innovation projects form part of the vision for this community. The short-term aim is to open a food hub that is supported by region-specific social enterprises that can decrease the food hub's reliance on funding through grants. Curation has permitted space for this exploration to occur in the hopes that documenting this community-based work may also provide valuable insights into financing transitions.

During curation the focus of a practice is changed by intentionally seeking out projects with transition-potential. A set of determining factors help guide the decision-making process, and the more closely aligned to sustainable futures the better. In my practice I remain open to standalone design projects for financial stabilisation, however I am more cognisant of what these projects are and how they might contribute more broadly to transitions. For example, designing a series of handbooks about self-care and activating change for changemakers is a standalone communication design project for a cause-client that feels conceptually linked to the work I am doing in transitions. An interaction design project that aids in architectural specification of materials feels less linked to transitions, yet it has been redirected from a series of unsustainable printed manuals to an agile digital product to increase accuracy in published data, and its profits help fund community-based work within my practice. Furthermore, conversations about the transition-potential of this large organisation have started. Despite the latter project's commercial face, it is part of the transition, primarily because I have asked for it to be. Open communication with current and potential clients and collaborators facilitates larger conversations about transitions, and these form an important part of this curation process. Without such discussions the transition-potential in a project or an organisation remains speculatory.

Transition design is slow and patient work (Irwin, 2018) and there is an art to saying no in favour of the slow. The curation process is likely altered by a number of different factors from one practice to the next and a number of tensions arise from it, many of which appear to be financial and/or ethical. Striking a balance can be a challenge in itself and curating the transition in an established practice takes time, but open conversations permit qualification of the possibilities, from this comes a more informed process of curation.

Tensions in the existential practice of transition design

Navigating the pain points in a practice's transition can be challenging, and there are obvious tensions between the need for financial security and the desire for utopia. But there is no pardon for design on matters of sustainability, and these tensions must be managed in order to practice transition design. Practitioners who are driven by deadlines and budgets in commercial practice may struggle with the ambiguity of transition design, in which projects tend to be emergent and often have imperceptible end-points, so patience, resilience and determination are required to comfortably experience the temporality of design for transitions. What follows is a discussion of four pain points that have been navigated during the first two years of transition: the process of sacrifice, the structural and financial changes made to the practice to support the ongoing transition, the transitioning professional identity, and the critical boldness required in briefing.

Sacrifice by design—a commitment to change

To transition a practice is to design a necessary process of sacrifice, the first part of which is making a commitment to change. This process will differ from practice to practice, what remains constant is the eventual need to say no to 'defuturing' projects. Should suggestions of alternative approaches, redirections or strategies for change be deemed unachievable, earnest consideration of the divestment of labour must begin. Every practice in transition will likely experience the need to say no—sometimes to the kinds of projects that may have historically defined them—in order to create space for the kinds of projects that will define them in the future. It is in this metaphoric space that a designer becomes empowered and enabled. Projects do not

exist in this space, rather it is open and held, filled only with possibility. If this process of sacrifice is not designed it can feel unmanageable as it may involve letting go of clients, projects, or both, and with this can come a sense of loss or grief. If the process of sacrifice is designed by the practitioner making the sacrifices then it can be managed, chosen and performed in ways that create the necessary space for transition design. Feeling some sense of control over the process can help alleviate any sense of pain, loss or grief.

The pressure of 'slow' on regular cash flow

The economic argument is one of the loudest, and I must acknowledge several privileges that have reduced risk exposure in my practice. Throughout the duration of my PhD (corollary my practice's transition) I have been in receipt of a scholarship stipend that has provided a safety net of sorts. Slower transition design projects have been pursued securely, in-part from the knowledge that this stipend would cover some of my living expenses. This PhD research has also facilitated the pursuit of theoretical and practical knowledge needed to perform transitions, including increased eco-literacy and an understanding of economic possibilities within ecological contexts. Further to this, I have also run a sustainable design practice for more than a decade, and my clients are (for the most part) aware of my politics, which I believe has made some of my conversations about transition design easier. The misaligned few were sacrificed in order to create space.

Whilst these privileges have reduced my risk and exposure, there are still financial implications to transition design that I have had to consider. The longer delivery window requires a different approach to invoicing and payment cycles as monthly invoicing is not always applicable, and milestone invoicing can leave long lean periods between invoices. What has made this process financially manageable has been the ongoing development of standalone projects as outlined in earlier discussions on curating space. Continued work in the 'greener things' space has provided financial stabilisation, however this work is being done with a curatorial approach to ensure it is transition design that thrives in the practice ongoing. At times these stabilising steps can feel like a step backwards, but maintaining a focus on developing standalone projects that are connected to future visions or that have transition-potential makes this process less discouraging.

Working in transitions requires an openness to change within your own practice structures, particularly during transitionary periods, and developing flexible working arrangements has increased the agility of my practice as a business. This has included the combined use of co-working spaces and a home-based studio to reduce premise-related financial commitments and engaging in more flexible working relationships with sole-practitioners/consultants rather than having employees with fixed expenses. Nurturing long term collaborative relationships with other practitioners also opens up opportunities to expose them to transition design and provides the agility needed for team-kairos (Greek for the right thing at the right time). This is building a network of transition-savvy designers around me, facilitating strategic workflow management, and creating time for development of transition design projects while overseeing standalone projects.

The professional identity in flux

Transitioning a practice also leads to a transitioning professional identity, and the pressure to present the right kind of professional narrative can be all encompassing. The digital landscape of professional social media such as LinkedIn, Medium, Behance and other similar sites demand a biography that presents a clear narrative of our work. In these settings, professional standing is often tied to completion—a body of work rather than work in progress, having transitioned rather than being in transition. Resilience and humility are required in order to be transparently in flux in this professional narrative.

Bravery in briefing

Design's co-dependency on Business can impact decision making, and without addressing the financial commitments of a practice (limiting employee 'mouths to feed', reducing overheads et cetera) this co-dependency could lead to saying yes to projects that infringe on the space allocated to transition design. Saying yes is a design industry habit, and the underlying aims of a pre-determined industry brief are rarely redirected. To break the habit of saying yes, critical questioning must sit bravely between a brief and the response to it. This criticality and the possibility of saying no to a brief must become a conscious practice. Like any change in habits this can pose challenges, and in this instance those challenges often have financial implications (hence the concept of sacrifice raised earlier). The concern of financial commitment looms large for many practitioners, and if ever there was an argument for a smaller practice base with increased agility this is it. The importance of criticality cannot be understated; critical questioning, challenging the desired outcomes of briefs and engaging in conscious deliberation over a brief's suitability can change the power

dynamics of the client-designer relationship. This bold political act requires empowerment, but brave designers will reap the rewards of curated space for the work of transition design and a relocation of power in relation to client-fed projects.

Conclusion

This paper has discussed several aspects of transition: a personal, political and professional transformation, transitioning a practice while exploring transition design projects, and an overview of four accompanying tensions that arise from this process. It has presented a case for curating space, designing a process of sacrifice, for allocating adequate time to transitions and for being open to business structure changes that can increase a practice's agility and make financial sacrifices manageable. Moreover, it reveals the existential nature of design for transitions, demonstrating the important role that personal and political transformations can play in the process of transitioning a design practice.

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The influence of design thinking tools on NGO accountability

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There is continued criticism regarding the over-reliance on donor-centred accountability mechanisms in aid projects. Conversely, there is increasing interest in Design Thinking as an approach to support greater beneficiary-centred accountability. Accountability can be conceptualised as 'felt' *virtue* which privileges internal motivations *of* decision-makers; and as 'imposed' *mechanism* which privileges externally enforced structures *on* decision-makers. However, there is limited understanding about whether Design Thinking tools can influence the accountability of decision-makers. This participatory action research study utilised semi-structured interviews and observations. The analysis revealed decision-makers perceived two tools, being Personas and Journey Maps, as having influenced their 'felt' accountability. Suggestions on how the tools may be contributing to the 'felt' accountability of decision-makers include: building a shared picture among diverse groups, humanising complex information, grounding discussions in realities, and deepening empathy. This study contributes to extant literature by showing that Design Thinking can enhance, decision-makers' 'felt' accountability through new sense-making practices and tools.

Keywords: Accountability, NGOs, Design Thinking, HCD, Personas, Journey Maps

Introduction

For the past 20 years, there has been increasing scrutiny of developmental Non-Government Organisations (NGOs) to assess the impact of their projects on beneficiaries (Andrews 2014; O'Dwyer & Unerman 2007; Ebrahim 2009; Madon 1999). As a result of this increasing scrutiny, NGOs have been institutionalising a host of accountability mechanisms (Ebrahim 2009; Schmitz et al. 2012; O'Dwyer & Boomsma 2015). To date, the mechanisms employed are often founded on quantitative-heavy and linear, cause-effect models of change in human systems (Ronalds 2012; Britton 2005). However, decision-makers within NGOs who oversee projects have protested that imposed donor-centred accountability practices have become too dominant and undermine more beneficiary-centred accountability practices (Schmitz et al. 2012; Murtaza 2012; Porter & Kramer 2011). With this ongoing accountability tension as a backdrop, individual decision-makers within NGOs have turned to Design Thinking for new inspirations and tools that could support them in aligning with beneficiary needs and preferences (see for examples, Bazzano et al. 2017; Toyama 2017; Jackson 2015; Amatullo 2015; Fotso & Fogarty 2015; Catalani et al. 2014). Since this is a recent development, not much is known about the effects of using Design Thinking within NGOs. This paper seeks to fill this gap by examining the effects of Design Thinking may have on accountability within two different NGO contexts. The two cases

highlighted in this paper are snapshots of longer-term design processes facilitated by professional design firms who were commissioned for the projects.

Theoretical Framework

Accountability

Tetlock (1985, p. 307) defined accountability as *'a critical rule and norm enforcement mechanism: the social psychological link between individual decision-makers on the one hand and the social systems to which they belong on the other.'* This definition is somewhat limited in scope because it does not encompass the possibility of self-accountability (Dhiman, 2017). Building on the definition of Frink and Klimoski (1998, p. 9), we see accountability as "perceived need to justify or defend a decision or action to some audience(s) which has potential reward and sanctions power", which may also include the perceived need to justify or defend a decision of action to 'the self'.

A useful way to break down accountability as a concept is to distinguish between its most common uses; firstly, as a 'felt' virtue and secondly, as an 'imposed' mechanism. As a *virtue*, accountability is perceived as a characteristic where a decision-maker demonstrates a willingness to accept responsibility, while as a *mechanism*, accountability is perceived as a process in which a decision-maker is obligated to explain their actions to another party who has the right to pass judgment on the actions as well as to subject the person to potential consequences for their actions (Bovens 2014; Tetlock et al. 1989).

In aid project settings, imposed accountability regimes are predominantly made up of formal oversight and control mechanisms placed on NGOs and their individual decision-makers (O'Dwyer & Boomsma 2015, Edwards & Hulme 1995; Najam 1996; Roberts 2001; Sinclair 1995). In this type of regime, people need to justify their actions through 'the giving and demanding of reasons for conduct' (Sinclair 1995, p. 221). This translates into compliance-based accountability that takes the form of short-term accounting for resource use, activities and outputs (O'Dwyer & Boomsma 2015). In contrast, 'felt' accountability regimes would privilege the internal motivation of decision-makers instead of the external pressures placed on them by funders and/or their own NGO structures (O'Dwyer & Boomsma 2015). Within this type of regime, individuals possess an intrinsic responsibility to 'feel' accountable or answerable to themselves in the form of their own values, ethics and morals, which they seek to align with those of other key stakeholders (Lewis & Madon 2004; Sinclair 1995). In practice, 'felt' and imposed accountability regimes co-exist to varying degrees (O'Dwyer & Boomsma 2015). Given the very different characteristics of both regimes, decision-makers will need to manage their co-existence by attempting to balance externally imposed accountability demands with internally driven 'felt' accountabilities (Dempsey 2007; Fry 1995; O'Dwyer & Boomsma 2015).

Accountability literature proposes several elements that influence the process of an individual decision-maker's accountability. Frink & Klimoski (1998) have identified different elements, which include social context in which agent is situated; observation and evaluation by a principal; standards and expectations against which agent's behaviour is judged; agent's belief that they will have to answer, justify or defend the decisions; decision related outcomes highly valued by agent (specified or unspecified, objective or subjective); and actual decision or action. Typically, decision-makers can find themselves in situations with conflicting accountabilities due to a number of contradictory elements coming from different directions and stakeholders (ie. being pulled in different directions based on NGO, donor, beneficiary, and self).

It has been argued that decision-makers of aid projects tend to prioritise donor-centred accountability, at the expense of beneficiary-centred accountability, as they depend on donors for professional survival (Edwards & Hulme 2002). Some of the institutional pressures most commonly referred to in the literature include logical planning approaches (Golini, Landoni & Kalchschmidt 2018; Bakewell & Garbutt 2005), linear project processes (Edmonds & Cook 2014), and quantitative-heavy data dependencies (O'Dwyer & Boomsma 2015). Many decision-makers of aid projects have adopted these traditional management practices which have brought with them stringent audit cultures fixated on procedural numbers and obligatory reporting (Angus 2008). However, these practices of accountability are susceptible to criticism for expecting decision-makers to sacrifice their personal empathy and sense of solidarity. This kind of personal empathy often comes from shared experiences and qualitative activities such as storytelling and collaborative future-making (Gair 2012).

Design Thinking

Design thinking's role in aid was recently highlighted by Escobar (2018) as supporting the 'collective determination towards transitions' that is based on a pluralism of perspectives. What Escobar refers to as the 'pluriverse' in his book is specifically referring to pluralism of perspectives without pre-existing universals (Blaser, de la Cadena, and Escobar 2009). In this book, he asks, could a new breed of designers be thought of as 'transitions activists'? (Escobar, 2018: 7). There is extensive discussion in the broader management literature where decision-makers from other sectors have turned to Design Thinking for new inspirations (Liedtka 2000, 2004).

Within the broader management literature, Design Thinking has been described as the best counter to constrictive management approaches – and as the best way to be creative and innovative (Liedtka 2018; Liedtka 2000; Johansson-Sköldberg, Woodilla et al. 2013; Boland & Collopy 2004; Dunne & Martin 2006). The term 'Design Thinking' has varied meanings depending on its context. According to Dunne and Martin (2006) and Liedtka (2015), Design Thinking is a human-centred and open-minded approach to problem-solving, based on the way designers think and work. In contrast to conventional management approaches, Design Thinking therefore offers decision-makers a 'human-centred' knowledge system rooted in empathy with users, a pluralism of perspectives, experimentation and co-design of solutions (Liedtka 2018; Liedtka et al. 2013).

A large number of possible design methods and tools can be used to facilitate a Design Thinking process in a project setting. Alves and Nunes (2013) created a taxonomy based on a study of ten sources and review of 164 methods and tools used by designers. The 10 most commonly used and referenced Design Thinking methods and tools according to Alves and Nunes (2013) are: Service Blueprint, Journey Map, Focus Group, Interview, Observations, User Personas, Prototyping, Scenarios, Shadowing, and Storyboarding.

A Framework on accountability in aid projects

When the notion of accountability is understood more broadly than an institutionally imposed *mechanism*, but also as an individually felt *virtue* that is driven by personal ethics, then this may present an opportunity to re-calibrate the accountability debate taking place in the aid sector to a more balanced one that includes both interpretations. Very few accounts explore the notion of 'felt' accountability at the individual level which may be considered to hold a great deal of promise for decision-makers in allowing them to continue their 'vital' work (McGann & Johnstone 2005). Although the criticality of accountability in aid projects has long been acknowledged, and there are some decision-makers turning to Design Thinking to support more beneficiary-centred accountability, there remains limited academic attention to examining the role of Design Thinking tools in this context.

The theoretical concepts from the accountability body of knowledge have been consolidated into Figure 1.
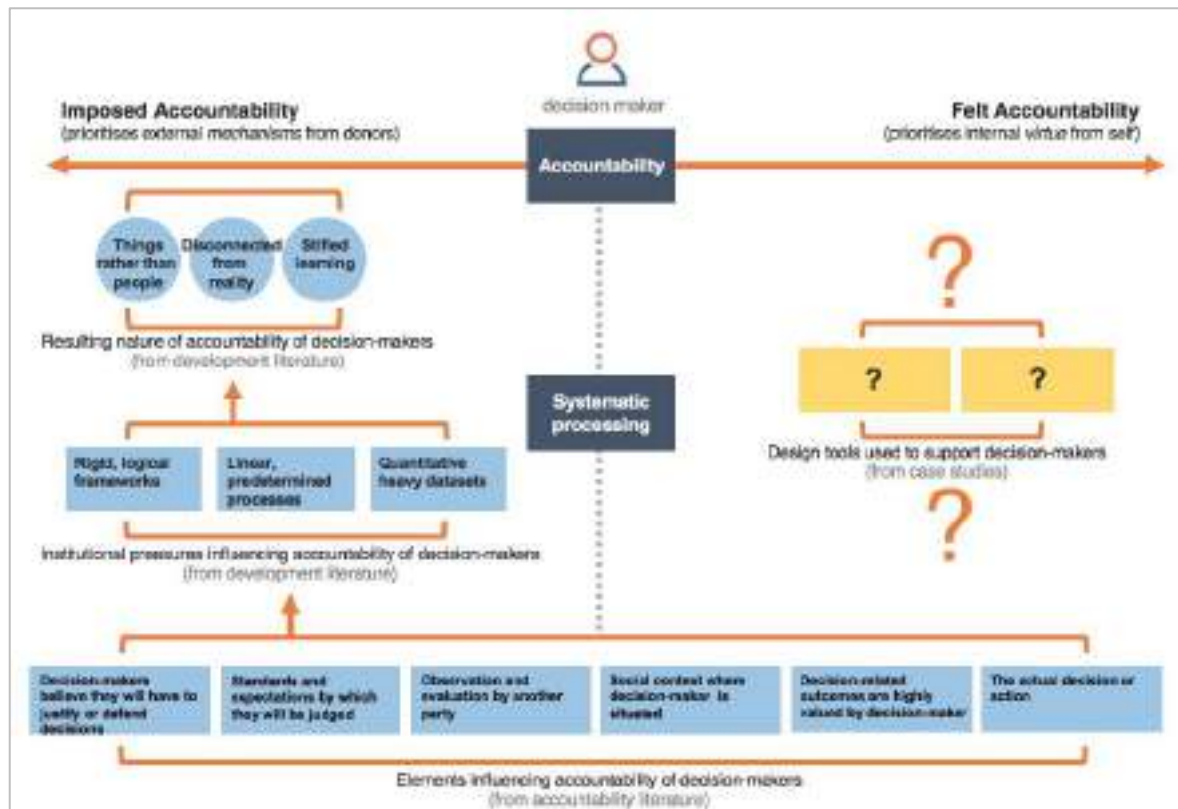
Figure 1: Consolidated concepts from literature review.
Source: Authors consolidating concepts from theory and literature review

Based on this consolidation, the primary question guiding our research is:

> **Can Design Thinking tools influence 'felt' accountability of decision-makers in aid projects? If so, which ones and how?**

This paper demonstrates how design thinking tools support the 'collective determination towards transitions' by opening up decision makers within NGOs to a variety of new sense-making and accountability practices (Escobar 2015, 2018).

Method

The researchers sought to observe and construct explanations based on 'real world' phenomena (Guba & Lincoln 1994). The notion of constructing explanations based on 'real world' phenomena pointed the research design to inductive processes, which produce theory rather than a clear conclusion or hypothesis (Cooper & Emory 1995; McMurray et al. 2004). The theory produced is based on an *'inferential jump beyond the evidence presented'* (Cooper & Emory 1995, p. 27) and is described by McMurray et al. (2004, p. 70) as *'the only sensible manner of proceeding'* when too little is understood about the phenomenon being researched. Taking an inductive approach has meant this study is unable to provide a truly valid theory because there still stands the potential for many other alternative explanations (Abercrombie et al. 2000; Cooper & Emory 1995).

The combined action research and supplementary qualitative methods involved a cycle of 'plan-act-collect-reflect' (Kemmis and McTaggart, 1988) in two 'real world' projects. The plan stage involved research design and case/participant selection. The act stage involved the researcher actively engaged in the project by facilitating the Design Thinking process. The first author engaged in natural observation as a participant in the projects, especially in relation to non-verbal behaviour in day-to-day activities while part of the teams (McMurray et al. 2004; Ticehurst & Veal 2000; Baily 1978). The observe stage involved the researcher conducting semi-structured interviews with decision-makers. Using semi-structured interviews enabled the

capture of stories, feelings, values and relational aspects (Engel & Schutt 2009). The reflect stage involved grounded theory (Strauss & Corbin 1994), which provided the systematic guidelines for gathering and analysing data using inductive strategies (Bryant & Charmaz 2007). It was used to guide the manual analysis of category themes, supplemented by software-based analysis using NVivo 10. The theoretical analysis of the data relied on key issues emerging rather than forcing concepts into any pre-conceived categories. Lastly, the notion of the 'case' as a bounded system (Smith & Johnson, 1973) for this study refers to two particular project cases bounded by geography, timeframe, organisation and sectoral focus. For this study, the notion of a case study provides a bounded focus and real-world inspiration toward new ideas for better understanding the phenomena being studied (Stake 1978, 1994).

We studied two case studies.

The first case study, indicated as *Rethinking Humanitarian Action*, was focused on rethinking humanitarian action led by a research NGO in the United Kingdom (UK). The Design Thinking process involved over 100 participants, who ranged from aid recipients to funders, to implementers, and policy-makers across 16 locations and 73 organisations worldwide. Although a meaningful effort was made to speak to as many different perspectives as possible, there was a particular emphasis on the protracted humanitarian crisis caused by the Syria conflict, which involved primary research in the refugee host country of Lebanon. This project applied six out of ten of the most commonly used Design Thinking methods and tools, as surveyed by Alves and Nunes (2013). These were 75 x Interviews, 1 week of Observations, 14 x Personas, 12 x Journey Maps. and several co-design workshops with Prototyping and Scenarios (ie. Role Plays).

The second case study, indicated as *Care Community Hub*, was focused on researching, designing, building and pilot-testing a mobile phone application to support community health nurses in delivering care in Ghana. The Design Thinking process involved approximately 110 people comprised of 60 community health nurses, 12 nurse supervisors, 18 pregnant women and nursing mothers, as well as more than 20 stakeholders from the partner organisations in Ghana. This project applied eight out of ten of the most commonly used Design Thinking methods and tools, as surveyed by Alves and Nunes (2013). These were: 10 x Focus Groups, 12 x Interviews, 2 weeks of Observations, 3 x Personas, 4 x Journey Maps, and several co-design workshops of Prototyping, Scenarios (ie. Role Plays), and Blueprinting.

The two cases highlighted in this paper are snapshots of longer-term design processes facilitated by professional design firms who were commissioned for the projects. In both cases, Design Thinking was not aimed at producing new academic knowledge, but rather at framing challenges and developing solutions in a human-centred way, through the words and imaginations of people experiencing them.

Findings

Case Study 1: Rethinking Humanitarian Action

Which tools were identified as most influential?

In this project, Personas and Journey Maps were repeatedly cited by interviewees as being most influential for their individual processes of 'felt' accountability over any of the other Design Thinking tools or methods. As will be demonstrated through quotations from the interviews below, both of these tools were mentioned by the interviewees as helping them 'walk in the user's shoes' and identifying more meaningful user experiences (Holmlid & Evenson 2008).

There were 14 Personas created to represent the needs and preferences of six groups of primary and secondary users of the humanitarian system. The Personas were based on patterns and composites of the 75 interviews. The personas were differentiated in way that demonstrated a user's relative capacity to influence change as well as their relative degree of 'affectedness' as it relates to crisis. Other characteristics used to differentiate between the personas included a combination of intrinsic and extrinsic qualities. There were six persona categories 1) Persons affected by crisis; 2) NGO Responders; 3) United Nations; 4) Funders; 5) Hosts; and 6) Knowledge Generators. Each persona was elaborated on (see figure 2 below):

LONG-TIME REFUGEE AFFECTED BY CRISIS

A Palestinian refugee, born in a camp in northern Lebanon and seeking work.

Zahaar

The self-reliant refugee

MY ASPIRATIONS include wanting to grow my personal network and feel a sense of belonging, and being connected with job opportunities so that I can show that being refugee does not mean you are downtrodden or helpless.

MY FRUSTRATIONS include the discrimination and misunderstanding I feel when labelled as a "refugee," the desire for people to give me more credit, and the difficulty of being away from my family.

THE CHANGE I'D LIKE TO SEE includes a camp experience which provides a pathway to a better life, flexible programming that accommodates my needs, and a host country that better understands/responds to my needs.

RECENT REFUGEE AFFECTED BY CRISIS

Separated from her husband during migration out of Syria, Sifa now makes and sells jewellery in a camp to support her children.

Sifa

The system-reliant refugee

MY ASPIRATIONS include wanting to be fully self-sufficient through stable employment, to regain a sense of self-confidence, and to see my children fulfil their own dreams of getting out of this camp for a better work opportunity here or abroad.

MY FRUSTRATIONS include feeling stifled in the camp and being treated like I'm less than human. Since I was abused, I haven't felt safe alone in a long time. I am always thinking of my family and hoping one day we have the chance to reunite.

THE CHANGE I'D LIKE TO SEE includes having a camp atmosphere which is more cohesive and embracing (less rules-oriented). I would really like to understand where I can find opportunities to be more productive so that I can support my children to leave and can fund the (psychosocial) support I need.

Figure 2: Two personas from 'Persons affected by crisis' category.
Source: ODI A Design Experiment – Imagining Alternative Humanitarian Action Report (2018), with permission.

In addition to the personas, there were 12 Journey Maps created to represent the stories and experiences of various users in the humanitarian system. The stories were shortened and consolidated but were maintained in the raw 'first-person' verbatim form. In one example (Figure 3), the 'reluctant host' being the municipality mayor of a village in northern Lebanon shared his experience.

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EXPERIENCE MAP 7

Divide and disempower HOST MUNICIPALITY MAYOR, LEBANON

Figure 3: One example of journey / experience maps
Source: ODI A Design Experiment – Imagining Alternative Humanitarian Action Report (2018), with permission.

What was the influence on 'felt' accountability?

The interviewees shared that for them personally, the Journey Maps (also referred to as experience maps) and Personas were the most influential of the design tools. Interviewees described the influence of the tools in both functional and emotional terms:

> *[The personas] deepened our empathy to develop a more user-friendly human system – Decision-maker C*

> *Throughout the project, nothing that anyone else said struck me or touched me as much as what was in those experience maps – Decision-maker D*

Another interviewee shared that the Journey Maps showed her how human experiences of the same phenomena could be diametrically opposed. This deliberate opportunity to dive deep into many different and conflicting perspectives had significant implications for someone in a decision-making position. She stated that she thinks of humanitarian aid experience as having a certain dynamic where there are 'givers' and 'receivers'. The Journey Maps helped surface those relational differences, making them more explicit when decisions were being made.

> *Because I am part of the givers, and although I could see the benefits and drawbacks of the system from my giver position, the [design] tools demonstrated to me that the receivers did not see those benefits and drawbacks in the same way. – Decision-maker A*

One decision-maker touched on the value of grounding across a 'spectrum of users' as it allowed him to better focus on the 'real issues' and avoid being side tracked by the usual requirements coming from donors and elsewhere. This interviewee shared how he noticed people regularly referred to the Personas to consider whether to design a certain feature or idea. Another interviewee shared why he believed the Persona tools were one of the main strengths of this project:

> *The main strength was the immersion in the user experience, and the continued reference back to it; and to thinking across a spectrum of users – like in the personas – rather than one or two stereotypical ones. – Decision-maker C*

When looking to make more human-centred decisions, the Personas helped reorient and ground conversations in the actual lives of people who would be affected by those decisions. This interviewee shared they were now more open to making decisions that were not driven by their own assumptions having gone through the Personas. The same interviewee shared how the design tools influenced the way he asks questions and the way he interacts with people on the receiving end of his work.

> *There was a granularity that tells the story, and you are able to see things that normally you wouldn't. At the level of director, you don't read things properly, you read things that summarise up, they are not as grounded, but these experience maps were compelling as they surfaced real issues – Decision-maker B*

> *After my experience with the design tools, it has influenced the way I approach my work. I ask a lot more questions. I ask very different questions. I ask much more granular questions rather than generic ones like 'how is this service?' – and I put more people and resources on seeking these more granular answers. – Decision-maker D*

The design tools helped change the nature of inquiry processes at an individual decision-maker level, as well as change the nature of conversations taking place on an interactional level. When asked about whether the Journey Maps influenced their sense of accountability, one responded with 'I just felt it' and went on to elaborate with the following reflection:

> *In a humanitarian response, whether you are in London or on the ground, there is a sense that people affected are 'other' – they are different to you, they have a different culture, religion, situation, like, they are in crisis and you are not. There are a host of reasons why you distinguish yourself from them. But what those experience maps did was put me at the centre of their crisis. In that moment, I remember feeling like I was transported to their world. And it made me ask myself – What would I do?*

And the truth is, instead of turning to the usual technical tools, I just wanted to do whatever I would do for my parents, my brother, my friend – Decision-maker A

The Journey Maps influenced her 'felt' accountability in a way that her decision making could be based on what she would want for herself and her family if she were in that situation. The tools clearly influenced her 'felt' accountability through facilitating a different position from which to base her decisions:

[The design tools] drove me to consider my role as being more deeply embedded in the human experiences of others – I was no longer separate from them, there was a direct connection – Decision-maker A

She no longer subscribed to her own othering attempts to distinguish herself from 'them', rather she was able to connect with others' experiences in a more human to human way.

I felt frustrated for them, I could see what was happening to them and it just pissed me off… It touched me, I had empathy for people who are in many ways unlike me, and in many ways just like me – it definitely increased my individual felt accountability towards them. – Decision-maker A

This emotional connection provided a strong drive and motivation for seeking a change and feeling more accountability to a particular group experiencing a particular problem. From the viewpoint of another decision-maker, there were still some strong emotional reactions prompted by the Journey Maps for other reasons:

When I read them, they made me very angry and very sad. The corruption ones, the ones from the Syrian refugees in Turkey and Palestine talking about how corrupt the UN system was, that made me angry in that self-righteous way. I wanted to drop everything else and go out and correct that corruption. It stoked the flame of action within me. – Decision-maker B

Though, when asked whether these feelings influenced his sense of individual 'felt' accountability, there was some tension in the response:

If you want to save the world, but the feedback from the experience maps told you what you're doing isn't right, then it triggers more than a 'felt' accountability. For me, it triggered a self-interest to want to do a good job for myself, it is kind of pleasure seeking. – Decision-maker B

The influence the design tools had seemed 'more than a felt accountability' and this interviewee questioned whether it had more to do with a desire to do good and look good rather than it being accountability related:

There's a different feeling that comes out with Design Thinking that makes me act better, make better decisions, change what needs to change in a program… I don't know if this is about accountability as much as it is about an individual's moral investment in doing a good job. Accountability, to me, has always been something external to me: It is the ability of someone else to hold me responsible for what I have done. Whereas Design Thinking put me in touch with the fact that I may not be doing a good job, so for me that is about self-esteem and self-interest. – Decision-maker B

However, based on the literature on the six different elements which can influence someone's 'felt' accountability discussed earlier, those elements such as a self-interest to do a good job can still be considered accountability related, theoretically speaking.

Because of the experience with the design tools, not only was a sense of 'felt' accountability influenced, but also broader influences on how to approach problems differently in their roles. Solutions to systemic problems in the aid sector should not always be technical, some need to be more behavioural. This contrast between the technical and the behavioural also resembles some parallels with the literature on accountability and the contrast between the mechanism (more akin to technical) and the virtue (more akin to behavioural).

Case Study 2: Care Community Hub

Which tools were identified as most influential?

The Design Thinking tools that were singled out and identified by decision-makers as enhancing their 'felt' accountability for this project were Personas and Journey Maps. Both of these tools were mentioned by the interviewees as helping them put the user front of mind (Floyd, Jones, & Twidale 2008).

In this project, three nurse personas were created through collaboratively debating the differentiating characteristics and patterns based on real nurse quotes and stories. Two dimensions were prioritised along two axes, where one axes represented if a nurse was purpose-driven (driven to provide care for the sick) or paycheck-driven, while the other axes represented a nurse's ability to be resilient or become dispirited in the face of challenges (Andrawes, Moorthy & McMurray 2016).

Figure 4: Persona framework and example
Source: CCH Service Design Blueprint (2014), with permission.
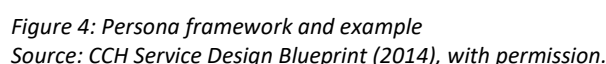
A series of process mapping of the steps, the highs, and the lows of the most common workflows were conducted to capture the four journey maps. These included: (1) routine home visits; (2) community outreach or clinics; (3) supervisory visits; and (4) monthly data reporting. See example below:

Figure 5: Journey/Experience Map for Routine Home Visits
Source: CCH Service Design Blueprint (2014), with permission.

What was the influence on 'felt' accountability?

Interviewees who worked closely together in the field, shared how the Personas helped them place emphasis in their day-to-day work on Mary, Naana and Michael. Instead of adopting the organisation-wide notion of accountability tied to a goal of 'reaching' 30 million people, they perceived the Personas as influencing their sense of accountability in a very personal and individual way.

> *Taking time out of what is considered to be my job in my job description, and walking in the shoes of the nurses, this changed my entire outlook on the project and whom I am going to work for everyday – Decision-maker IM2*

Their personal goals and targets in their jobs were no longer about reaching the greatest number of people possible to report back on, but rather invest wholly in making a real and marked impact on the lives of people whom they did reach. For another interviewee who was not in the field, also commented on how the personas provided a useful counter narrative to 'humanise' the statistics that usually guide their decisions:

> *These actual human stories helped humanise our user and kept me thinking about that individual user in mind – or multiple personas if you will – throughout the project, it influenced me in a different way to the usual thinking in statistics – Decision-maker IM5*

Reflections from decision-makers in this project suggests the potential for real and marked impact on the lives of users can be hindered when the interviewees felt like they were being forced to be made accountable based on the number of people 'reached' than more meaningful (relational or behavioural) changes that can be more difficult to account for.

The personification of beneficiaries otherwise referred to in numerical terms influenced the interviewee's sense of who they felt they worked for – from the 30 million number senior management had set or the real-life impact on Mary, Naana or Michael. Decisions became about the latter rather than the former when impact was defined in ways they could relate to and connect with on a human level.

> *I would wake up in the morning with the nurses' on my mind. My sense of accountability to them felt different to my sense of accountability on other projects. – Decision-maker IM1*

These decisions would take place within the confines of boardrooms and NGO offices, but by putting the personas up on the walls and keeping the nurses' voices present, it made them feel like they were able to stay accountable to their beneficiaries.

> *The personas gave us a whole new language to speak about the reasons why behind every decision… because this person is like that, we need to do it like this… This made me feel like I was doing my bit for the nurses. – Decision-maker IM1*

One interviewee who was not part of the design research activities early on in the process reflected on the longer-term influence of this:

> *I wasn't able to go to the field with the others. But those personas you all created helped bring – and keep – the nurses voices in our boardroom decisions and meetings for months and months after the fact – Decision-maker IM5*

For another interviewee who was heavily involved in the early stage design research reflected on how this experience was different for them:

> *But being able to slip into the nurses' shoes or the supervisors' shoes was easier for us to do naturally in the process, but not so much for the newer staff, they had to rely more on the personas and journeys – Decision-maker IM2*

For those who were part of the development of the tools, they felt a natural understanding and connection to the users. This made decision-making more naturally human-centred even without referring back to the Personas or Journey Maps as perhaps what they had learned had become intrinsic.

The Personas and Journey Maps were also used to facilitate the generation of ideas and this was noted by one interviewee as enhancing his 'felt' accountability towards the nurses:

> *The ideas were generated directly with a sample of those end-users in the room with us physically, and when they weren't in the room, the ideas were generated or built upon with a persona lens, so that at least, at a subtle level, the end users were still 'in the room with us' and I felt more accountable to them that way because we were still honouring their preferences in their absence – Decision-maker IM6*

Quantitative formulations of accountability mechanisms within NGOs, such as defining targets based on number of beneficiaries reached, can influence how the interviewees described their individual sense of accountability. Regardless, all interviewees shared how the Personas enhanced and supported their personal 'felt' accountability, whether through informing more user-centred decisions, or having a personified user to remind of the why their work is important, rather than objectified statistics.

Discussion

The analysis points to the use of Personas and Journey Maps as having four influencing factors on decision-makers' 'felt' accountability:

1. Builds a shared picture
2. Humanises complex information
3. Grounds discussions in reality
4. Deepens empathy and connection

Influencing Factor 1: Builds a shared picture

Instead of decision-makers having to make sense of contradictory pictures of reality and competing narratives (Liedtka 2004), the design tools were perceived by interviewees to help build a shared picture that supported alignment among decision-makers. For example, when one decision-maker shared that reading all the Journey Maps at the same time solidified how different people experienced the same thing differently depending on where they stand in the system. The Journey Maps helped the decision-maker seem to be less likely driven by individual cognitive bias (Liedtka 2015). In this case study, establishing a shared picture has suggested that it may be more likely for decision-makers to feel an enhanced accountability towards the beneficiaries, without neglecting the other key stakeholders.

Influencing Factor 2: Humanises complex information

Instead of the usual over-reliance on statistical and survey data that has been criticised for disconnecting decision-makers from realities on the ground (Angus 2008), the design tools were perceived by interviewees to humanise otherwise complex information for decision making. The visual depictions used in the project were not intended to be accurate representations of absolute realities, they however provided decision-makers with new ways of understanding abstract issues that were lived experiences for the beneficiaries (Andrawes et al. 2016). For example, the journey map tool helped decision-makers get to the 'granularity' of stories without getting lost in the complexity of the problem, with decision-makers saying it helped them 'see things' they normally would not see themselves. Both tools embodied knowledge that could not easily be articulated using tables, words and numbers (Andrawes & McMurray 2014).

Influencing Factor 3: Grounds discussions in reality

Instead of decision-makers basing things on boardroom conversations and rigidly linear project plans (Edmonds & Cook 2014), the design tools helped ground discussions in actual situated stories and realities. This was in contrast to the status quo of basing decisions on 'expert' input, or averages and numerical samples from quantitative data sets. Prioritising the design based on the words and ideas of beneficiaries themselves, the Personas and Journey Maps helped decision-makers avoid the trap of making decisions based on what they thought beneficiaries want. Rather they were freed to base their decisions on what beneficiaries actually value.

Influencing Factor 4: Deepens empathy and connection

Through both tools, decision-makers shared a sense of a strong, grounded empathy for all their decisions. For example, one decision-maker used words like 'pissed off' and 'sad' and 'angry' to describe what they felt as they read through the Journey Maps. Although the tools were pervasive in the lives of decision-makers, they also provided a safe space, and a guided framework that triggers action for a potential change from the existing situation into a more preferred one (Simon 1967). The Journey Maps allowed decision-makers to walk in others' shoes, where they were able to better think about the decisions they have to make from those perspectives. Both the Personas and Journey Maps helped decision-makers develop a very personal and deep empathy that is directly traceable to the barriers and opportunities as articulated by the beneficiaries in their own words. From this knowledge, they shared how they were more likely to plan, design and make things with those other perspectives in mind.

Below, Figure 6 is a depiction of how these four influencing factors and the use of the Design Thinking tools fit in to the earlier framework derived from the accountability and development aid bodies of literature:
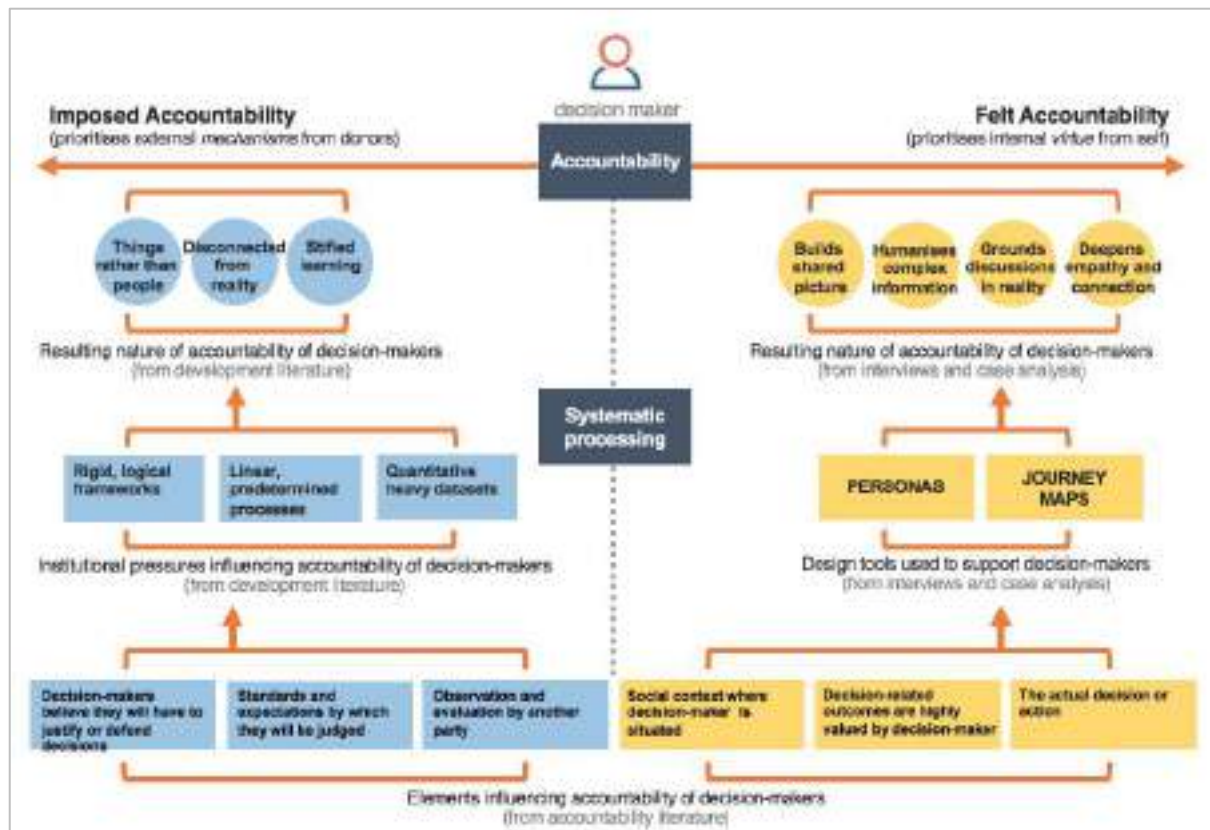
Figure 6: Conceptual Framework combining literature and findings
Source: Authors consolidating literature and findings

The conceptual model above demonstrates on the bottom right side that when the decision-related outcomes are highly valued, or the social context where decision-makers are situated is in close proximity to the beneficiaries, there seems to be an impact on accountability (Frink & Klimoski 1998; Tetlock 1999). When Design Thinking tools are used the impact is an internally *felt, virtue* version of accountability that is based on shared understandings, humanised information, contextually grounded discussions and deep human to human connection. Whereas on the bottom left side, when decision-makers believe they will have to justify their decisions (especially numerically) or have certain standards/expectations by which they will be judged or evaluated by another party. These seem to be enabling conditions for institutional pressures based on logical frameworks, linear processes and quantitative heavy dependencies to lead to an externally *imposed, mechanistic* version of accountability that reports on resource use, short term impacts and is disconnected from reality. It was observed that when decision-makers greatly valued the decision-related outcomes themselves – the use of the Personas and Journey Maps seemed to influence the decision-makers individually 'felt' accountability through the four contributing factors to their systematic processing. The four factors in this conceptual model are suggestive as to how Design Thinking tools could potentially contribute to enhanced 'felt' accountability in aid projects.

Conclusion

Although the debate around accountability in the aid literature has been growing in prominence, NGOs have maintained a track record of institutionalising mechanistic accountability regimes that prioritise donor requirements over beneficiary needs. Consolidating concepts from various bodies of literature and real-world practitioner experience, these action research case studies explored whether Design Thinking tools can influence the 'felt' accountability of decision-makers in an aid project.

This study's findings are timely and relevant because of the growing body of critique mounting against decision-makers in NGOs. The currently dominant model is weighted heavily towards imposed, mechanistic accountability that is not working adequately. New models of accountability need to be tried and experimented with to calibrate towards a more balanced practice of accountability. This study adds to the

specific arguments for an adaptive accountability in aid projects by Ebrahim (2009) and O'Dwyer and Boomsma (2015). Utilising Design Thinking tools and methods have supported decision-makers – according to their own accounts – in being able to practice a more enhanced 'felt' accountability towards beneficiaries in their day-to-day work. In this case, the Design Thinking tools that were identified as most influential on decision-makers' 'felt' accountability were Personas and Journey Maps. Findings from the case study show that when decision-makers 'greatly valued the decision-related outcomes themselves' (Frink & Klimoski 1998) the use of Personas and Journey Maps seemed to influence the 'systematic processing' (Tetlock 1985) of their 'felt' accountability through the four influencing factors of building a shared picture, humanising complex information, grounding discussions in reality, and deepening empathy and connection – where more personal and subjective materials supported decision-makers to feel the needs of the beneficiaries as their own.

Escobar's (2018) most recent analysis of design's role in development suggests that aid decision-makers ought to engage in a 'collective determination towards transitions' that is based on a pluralism of perspectives. Earlier in this paper, we asked, could a new breed of designers be thought of as 'transitions activists'? (Escobar, 2018: 7). This paper demonstrates how designers can use some of their tools to support aid decision-makers in their 'collective determination towards transitions' by opening up to a variety of new sense-making and world-making practices (2015, 2018).

The originality of this study is clear given there has been no prior attempt to understand whether Design Thinking could influence 'felt' accountability and supplement 'imposed' accountability mechanisms in aid projects. This study contributes to the aid accountability debate as it suggests that the inclusion of Design Thinking tools can influence, and even enhance the 'felt' accountability of decision-makers towards beneficiaries. In doing so, it contributes from a unique and interdisciplinary perspective, to the accountability debate in the aid sector. The findings also contribute to the more general, broader body of work on decision-maker accountability by the likes of Tetlock (1985), Lerner and Tetlock (1999) and Frink and Klimoski (1998), and Vance et al. (2013, 2015). For accountability researchers as well as decision-makers in practice, they could benefit from taking this study as a starting point for the use of Design Thinking in enabling more 'felt' accountability that balances out the heavy weighting towards imposed accountability.

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Track 2.e Introduction: Design Innovation and Philosophy of Technology, the Practical Turn

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Introduction

Human-technology relations are one of the key issues in design innovation and the shaping of our future. Also in the Philosophy of Technology human-technology relations are a central theme. New insights in the complex interplay between humans and technology can be gained from collaboration between Design and Philosophy of Technology, especially in the current of the so-called 'empirical turn' where the focus is on individual technologies and real-world contexts (Achterhuis, 2001; Verbeek, 2005). Design Innovation can use the frameworks of philosophers to theorize the findings from practice or to make sense of past developments. And designing actual things provides a powerful laboratory to test philosophical frameworks in practice. Through the collaboration between design innovation and philosophy these conceptual frameworks can become 'practical'. Therefore, in analogy with the empirical turn in philosophy of technology before, the further step of the present collaboration with design is termed a 'practical turn' (Eggink & Dorrestijn, 2018a).

Outlook

Philosophy of Technology has a substantial track record in thinking about the impacts of technology and innovations on our daily lives and social behaviours (Brey, 2012; Dorrestijn, 2012; Verbeek, 2014). Combining this conceptual toolkit with design innovation, with its capability of actually changing things, promises a powerful approach to developing critical future-making practices. This approach focuses on anticipating possibilities and consequences of innovations. As such, it is related to responsible innovation, social design and critical design, but also different in being more reflexive and explorative (Eggink & Dorrestijn, 2018b).

Using philosophy of technology frameworks to make sense of the world, we can also come to new insights and perspectives on the application of technology in innovations (Raub et al., 2018). In this sense it can also be a valuable addition to the Design Driven Innovation approach by Verganti (2009), where radical innovation is realized by changing the meaning of things (Eggink & Rompay, 2015). Especially when this approach is being criticized in the sense that "[t]here seems to be a need for more practice-based studies that connect Verganti's (2009) theoretical DDI framework [...] with design practice." (Kristiansen & Gausdal, 2018, p. 2).

Papers

Under the notion of a practical turn in the philosophy of technology this track brings together papers in which either insights from philosophy of technology become concretely applied in design innovations; or the other way around, the practice of design and innovation becomes a way of philosophical enquiry into technology. These papers reflect such a practical turn in the philosophy of technology in a broad variety, from practical design cases to a theoretical inquiry into the nature of contemporary design problems.

The first paper *Changing Things: Innovation through Design Philosophy* by Johan Redström and Heather Wiltse is the most theoretical. Redström and Wiltse make a case for using a Philosophy of Technology approach to develop design theory. As design is of course always future oriented, design theory is also always about change. However, in this paper the authors convincingly show how change is no longer a matter of time and place but rather has become a central characteristic of the products itself. We are therefore in need of new concepts to understand these changing products, for which Redström and Wiltse propose some insightful examples.

The second paper *Towards a Tangible Philosophy through Design, Exploring the question of being-in-the-world in the digital* age by Jonne van Belle, Jelle van Dijk and Wouter Eggink is more towards the practical side, containing a design case about the use of mobile phones in everyday life. In fact, van Belle et al. are broadening the concept of the practical turn by adding the term *Philosophy through Design*. In analogy with the concept of Research through Design (Findeli, 2010; Frayling, 1993), they are exploring a Philosophical concept inspired by the work of Tim Ingold through the design of concrete artefacts.

The paper *Values that Matter: Mediation theory and Design for Values* by Merlijn Smits, Bas Bredie, Harry van Goor and Peter-Paul Verbeek is the most practical of this track. In this work the authors show how specific Philosophy of Technology theory – in this case mediation theory by Verbeek (2015) – can inform design practice and design methodology alongside a case for value sensitive design.

In the last paper *From Hype to Practice: Revealing the Effects of AI in Service Design* Titta Jylkäs, Andrea Augsten and Satu Miettinen literally take a step back and zoom out again when they philosophise about the consequences of new technology – in this case the development of Artificial Intelligence – on the lives of people in general and service designers in particular. Therefore, this contribution nicely suits as a conclusion to this track, not by elaborating yet another philosophical design tool, but by showing "reflection in design" in the context of design research.

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Changing Things: Innovation through Design Philosophy

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Digital networked technologies are currently at the forefront of contemporary innovation, driving changes in sociotechnical practices across industrial sectors and in everyday life. Yet technical innovation has been outpacing our capacity to make sense of these technologies and the fundamental changes associated with them. This sense-making enterprise is the focus of our current research in developing a design philosophy for changing things. We describe a conceptual framework developed around the concept of things as fluid assemblages to investigate and articulate what is going on with things, and how their development might be (re)directed toward preferable futures. Specifically, we here examine the important role of design philosophy in innovation, using the conceptual framework developed as a way to point toward potential sites for innovation in the current sociotechnical landscape. The line of investigation we pursue suggests that doing philosophy should become a central part of innovative design practices.

Keywords: Fluid assemblages, design philosophy, design theory, networked, computational

Introduction

New technological developments require new ways of making sense of them. We can draw on conceptual tools we already have, but also need to make new ones that are more precisely tuned to what we now have in front of us and need to account for.

In this paper, we describe a conceptual framework that evolved in our ongoing research on developing a design philosophy for *changing things*. With this design philosophy we aim to more adequately account for networked computational things that are more inherently changing and changeable than the things we have known, designed, and lived with before. This account of what is going on with things is a necessary first step for working to change the more pernicious developmental trajectories of networked computational things toward preferable futures.

If, as we believe, the true measure of innovation is its capacity to bring about positive transformation of human experience and practice, then it is crucially important to address foundational questions regarding the role of innovative technologies and systems in human affairs. One of the central issues for design and innovation with respect to the networked computational things that are now at the forefront of technological research and development is therefore that we develop an ability to match technological drive with the conceptual and methodological developments that are required to make sense of them—and their consequences—at human scale.

Beginning with the background of key technological developments and a brief overview of historical innovation through design philosophy, we move on to describe how the conceptual framework we have been developing around things as *fluid assemblages* opens up new sites and approaches for innovation in relation to

digital, connected things. In the context of this paper, we use this work primarily as an illustration of why new sociotechnical developments and corresponding increases in complexity can require making new theory, and how this can open up new vantage points from which to approach understanding and innovative action.

Background: Need for new perspectives

The networked computational things (embedded computers, tablets, smartphones, smartwatches, apps, 'smart' assistants, etc.) we now live with are inherently different from past everyday things. Software changes visual forms and functions dynamically over time and across contexts; information processing capabilities change the ways we relate to things and what we expect of them; connectivity changes the ways things relate to each other and their scope and scale of action; and all of this changes our everyday practices in relation to the things in our lives. Networked computational technologies and the forms they take in the world are, in many senses, *changing things*. Understanding the character and scope of these changes is an important challenge, arguably one of the next big challenges for design and related fields oriented toward human experience and society. Changing things in directions that are amenable to human flourishing and desirable forms of life is an associated challenge that we now face.

There is, then, both tremendous opportunity and responsibility when it comes to making sense of the landscape of changing things, as well as finding and articulating the foundations that can support responsible innovation, education, research, and practice in relation to them. This requires thinking in new ways – building on existing perspectives, but also recognizing when they break down and no longer adequately account for things that have become substantively different. In order to properly see and understand the new, it will not suffice to think only in terms of the old. We need new conceptual frames, new methodological approaches, and new representational and discursive strategies within design, philosophy, and the social sciences in order to do justice to what is at stake and urgently calls for our attention and care.

Of course, there is already interesting and promising work in this space: for example, in investigating "thing perspectives" (Wakkary et al. 2017, Giaccardi et al. 2016), exploring the experience of "network anxieties" and their possible design metaphors (Pierce and DiSalvo 2017), and drawing on philosophy in order to better understand connected things and their relations (Hauser, Oogjes, Wakkary, & Verbeek, 2018; Wakkary, Oogjes, Lin, & Hauser, 2018) (Wakkary et al. 2018; (Akmal & Coulton, 2018; Lindley, Coulton, & Akmal, 2018). There have also been larger shifts within interaction design and related areas toward looking at ecologies of artifacts and connected services rather than single things (Dubberly, 2017; Forlizzi, 2008; Janlert & Stolterman, 2017; Stolterman, Jung, Ryan, & Siegel, 2013). Our purpose here is to complement this often more empirical work by trying to get to the bottom of changes that are taking place through working at the level of theoretical foundations, orientations and assumptions; and to explore practices of *making theory* as vital components of contemporary design research able to grapple with increasing complexity.

While these are big and complex challenges, and theory might on the surface seem rather far removed from practical impact, there is actually an encouraging precedent of innovation through design philosophy.

Approach: Innovation through design philosophy

The current need and also ambition of our ongoing work is the development of a design philosophy that can form and inform contemporary design practice in the domain of digital, networked, and as a result hugely complex systems, media, and artefacts. Given design's inherent focus on practically solving problems, it may seem odd to seek significant innovation in the realm of the conceptual and philosophical. However, design philosophies have been crucially important for innovations in the field, considering how design has developed historically.

In the early 20th century industrialization had come to a point where the influence of mass-production in everyday life had become so significant that it was clear that new approaches to design were necessary. New materials and technologies, not to mention the production techniques as such, had up until this point primarily been used to reproduce existing designs; but as things evolved it became increasingly obvious that a new approach was needed. There came a realization that what in fact was needed was a different understanding of design, another way of relating to form and material that made better use of the new possibilities. Today, we refer to this change in the making of things as the emergence of industrial design, distinct from craft. It is perhaps difficult to see this today since we are so used to it, but at the time reframing the relation between art and technology was actually a significant innovation at the level of design conceptualization. This was done

through using new ideas, such as that beauty resides in the usefulness of things – as expressed in the idiom "form follows function." Such ideas, or idioms, did not necessarily provide an answer to what designing should be in detail. However, they offered a way of thinking that opened up new perspectives on what could be done and how, when giving form to something had become separated from the actual making as the latter was industrialised. Indeed, it eventually provided the direction for an entire industrial sector engaged in the production of everyday things, and the field of industrial design.

Reflecting upon such historically important approaches to design, it could be said that the early industrial design philosophies were largely oriented toward *aesthetics* as a matter of resolving emerging complexities. Certainly, notions such as 'function' place ideas about use at the center; but use at this point was largely seen as a matter of finding the most appropriate expression of such functions. In other words, it concerned the basic aesthetic design problem of how to make something present, to come forth. Over time, however, we can see a gradual shift towards methodology as a way of responding to complexity. Instead of seeking solutions in a particular kind of expression or aesthetics, solutions are sought by means of systematic design methods, as in the approaches developed at The Ulm School of Design, the design methods movement originating in the UK in the 1960's, and in what came to be Scandinavian user-centered design. These were all responses to a kind of design complexity that design could not resolve by drawing. Instead, design had to become a multi-disciplinary effort. Attention thus turned to how information and ideas are obtained, shared and acted upon during the design process of moving from initial brief to final proposal.

Today we face a related change in design complexity, but one that neither form nor method can completely resolve. The basic reason is that our ordinary and, up until fairly recently, rather stable, categories are breaking down. For sure, design has for a long time worked with largely unknown possibilities that can only be grasped through iterative attempts at prototyping what that something could be, bringing it to presence in material form. But doing so we have still been able to rely on certain basics: such as that things remain largely the same over time in terms of their forms and functions; that it makes sense to distinguish between design and use, between production and consumption; and that designers in general, through design, control the actual outcome of the process. In fact, the point of structured design methodology is to do just that: to make design outcomes predictable. We believe, however, that there are strong reasons for not taking these basic assumptions for granted any longer.

The current sociotechnical context includes staggering and rapidly increasing complexity of current technologies and their systemic interconnections (both intentionally designed and emergent), dynamic networks, responsive things, and machine learning and artificial intelligence as new design materials. Facing this situation, there is a need for new *conceptual frameworks* that account for the consequences these changing things have in terms of human experience and society, both now and in the future. The new design philosophy that is now needed must respond to a networked, data-intensive society in which data about activity is the new basic resource generating economic growth (The Economist, 2017; Zuboff, 2015; 2016; 2019), and everyday connected things are the prime generators of this resource – and importantly, these are issues and aspects as 'new' to design as was once mass-production.

Just as design originally responded to the needs and dynamics of an industrial society, it must now figure out how to respond to a new and very different form of production and its social consequences. New technologies will always require new design methods, new development processes, new ideas about what services they make possible and so on and so forth – but they also require us to *think differently* about what it is that we are designing. When the car first came around it was called a 'horseless' carriage. Today we find this amusing – and yet, we talk about 'mobile' phones and 'wireless' networks. We understand the new in the terms of the old. And that is precisely why we need new conceptual frames and new design philosophies in order to also think and design in new ways that are more effective at grappling with our current reality. While recognizing the continuing importance of the aesthetic and role of designed things in human experience and society, they must also foreground the character of contemporary computational technologies in order to, in the end, adequately account for the role of these changing things in the world and in human experience.

While we have a significant toolbox of methods and methodology when it comes to solving problems, the more complex the problems become the less applicable become our tools. And as we approach the issue of design philosophies, it is far from obvious how to proceed. Fortunately, there is much to build on. From philosophy, we bring methodology regarding conceptual and argumentative precision, how discourse is created and challenged in forms such as texts and debates. From design research, we bring methodology pertaining to the materialization of complex ideas and issues through design experiments, prototypes and

more, where these processes and outcomes of making also enable associated discourse. In our work, we aim to combine the methods and methodologies of philosophy and design research, with the explicit purpose of crafting a design philosophy suitable for the conceptual, discursive, and practical intervention that is now needed. While it is not relevant to seek to direct practice by mere instruction, it is quite possible to influence it through catalyzing and scaffolding needed conversations in key spaces and discourses, and providing conceptual tools that can support thinking in new ways. This is the approach we take.

A conceptual framework: Fluid assemblages

Contemporary digital, computational, connected things are significantly different from the everyday things of even a couple decades ago, as well as these earlier objects of industrial design. They are constantly changing, both in response to specific contexts and users but also on the basis of software updates and multiple new versions tested against specific metrics (as in design by progressive optimization in agile development methodologies, using A/B testing methods and similar). They are also composed of a variety of physical and digital resources, both contained within things themselves and accessed via network and platform connections. Older things, too, have certainly been composed of a variety of elements, and it has been a primary task of design to intentionally compose these elements into unified wholes (Nelson & Stolterman, 2012). However, in the case of these newer connected things, there is a new scale of dynamism and scope entailed in these compositions. For these reasons, we have argued (Redström and Wiltse, 2015a; Redström and Wiltse, 2015b; Redström and Wiltse, 2019) that these things are better understood as *fluid assemblages* than as more traditional, stable things.

This notion of assemblages used here stems from the work of Deleuze and Guattari (Deleuze & Guattari, 1987). While it is not possible to do justice to the full richness of their conceptualization here, the concept deals with how something comes together. If we, in design, look at how different constituent parts can come together in a 'whole', an *assemblage* is different from both a collection and a totality. A *collection* does not gain any emergent properties, but can be taken apart with each part retaining its individual properties. A *totality* has emergent properties, but cannot be taken apart – in other words, the process of making it is not reversible. An *assemblage* both has emergent properties and can be taken apart. Further, its properties depend on the continuous interactions between the parts, and as soon as these stop the emergent properties disappear. This points to a crucial difference between the traditional industrial object and these new 'things': whereas the traditional object is a totality, where all the constituent parts are fused into a new and stable whole, our networked computational things are constantly 'made', configured in runtime. And just as fast as they are 'made', they 'fall apart' should, for example, the battery run out, the network connection drop, the authorization be revoked, or the server fail to respond.

Indeed, one of the key overarching aspects of fluid assemblages is that they entail dynamic and constitutive relations between the local and global. A thing that is made available as a thing for use (e.g., an app on a smartphone, a tabletop digital assistant, a wearable health and fitness tracker, or a web service) is actually made as a thing in nontrivial ways at runtime on the basis of both global settings (e.g., software version, current state of machine learning algorithms, etc.) and local customization (e.g., specific user account, location, history, time of day, preferences, etc.). In addition to functionality, there are also new business logics driving these relations. Things have become key sites for the production of data about people's everyday activities, and they are designed to maximize this production. Everyday activities are carried out and filtered through the transactional logic of these things and the platforms on which they operate that also render activities visible (Wiltse, 2014), comparable, and computable in data form (Alaimo & Kallinikos, 2017; Plantin, Lagoze, Edwards, & Sandvig, 2017). This data is the primary resource that is processed and metabolized within surveillance and platform capitalism, generating value mainly for the corporate actors operating or otherwise utilizing the platforms that things connect and feed into (Zuboff, 2015; Zuboff, 2016; Zuboff, 2019; Srnicek, 2017a ; Srnicek, 2017b). And in fact, Zuboff's (2019) monumental work in diagnosing and describing the mechanisms of "surveillance capitalism" and strategy of "naming in order to tame" is much in line with our approach and purpose here.

Telecommunications collapsed human notions of space, in some ways eliminating the importance of location in the sense we used to depend on it for communicating with each other; computation collapsed human notions of time, and the time it takes to compute something. The combination of these technologies and more in what we now call fluid assemblages implies a collapse also of scale. Whereas design used to be conditioned by the relationships forged between production and consumption, moving from models via prototypes to the

one prototype to be mass manufactured, this chain is increasingly collapsing not just in terms of time and space, but also with respect to the gradual scaling up towards production. Instead, what we have is code that adapts, each instance in some ways the same (we use the 'same' app) but at the same time always unique as customization happens in runtime (we all see slightly different things when using that app, depending on factors such as which user profile we are logged in as, where we are, what we have done before, etc.)

Fluid assemblages can be seen as the result of several trajectories of historical development, including computation and computationalism (Finn, 2017; Golumbia, 2009), marketing and the "attention economy" (Wu, 2016), information science, media, and interaction design. There are thus a number of associated perspectives that can be used in order to make sense of them. However, none of these is on its own able to adequately account for the more specific emergent properties and dynamics of fluid assemblages, both existing and potential (Wiltse, 2017). Investigating fluid assemblages also requires engagement in close quarters, revealing certain aspects from always strikingly partial and situated perspectives; and adequately accounting for them requires making appropriate conceptual tools.

We thus made a set of concepts to work with in bringing these aspects into focus, as an initial toolkit for exploring, working with, and (re)making fluid assemblages. We describe a few of them in what follows.

Tuning formations

One of the basic concepts that we need is one that helps us to identify and understand the basic 'what' it is that is designed when it comes to fluid assemblages, and ways of going about designing them. A concept that we developed for this purpose is *tuning formations*.

Fluid assemblages are not made in the traditional material sense, but are rather formed through algorithmic processes that rely on networked resources and connections. The object of design is thus not a final form, but the rules by which fluid assemblages come to take form as things capable of interaction through assembling a variety of components into temporarily stable formations and figurations. These things and the processes that create them are tuned[1] in relation to data generated through use. They are tuned when they are instantiated in order to respond to particular user profiles and contextual variables, but also at a more general level in relation to goals of the producers. Fluid assemblages entail ongoing relations and dynamic compositions, and they are made through practices of *tuning formations*: calibrating functional relations among elements and their collaborative evolution over time.

The shift from giving definitive form to continuous tuning of form, or formation, is already quite visible in the methodology developed to produce these kinds of 'things'. Whereas their physical presence still follows prevalent principles of industrial design form, the way their software is continuously updated does not. In particular, the extensive use of A/B testing and other ways of obtaining data to ground design decisions is of some importance here: instead of having to predict what design solution will be 'best', multiple versions of it are rolled out with specific sets of metrics being measured to obtain data regarding what solution most effectively achieves certain targets. In this way, what was previously a clear difference between the use that follows the release of a product and the 'user testing' of prototypes during the design process is here completely blurred. There is no telling where development ends and 'real' use starts. Another area where this turn towards tuning can be clearly seen is in the runtime adaptation to specific circumstances of use and user, such as tuning towards the account used and its history and a massive range of variables regarding context. Thus, what we have here are not things that are once and for all configured, or 'made', to be in and stay a certain way, but a kind of assemblage that is constantly in the making, constantly being tuned to achieve its objectives[2] as use unfolds.

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[1] The conception of tuning developed here has been in some ways inspired by Richard Coyne's conception of the tuning of space (Coyne, 2010).

[2] The objectives of the thing, in terms of the purpose for which it is designed, align only partially with those of the humans formerly known as users. In fact, end users are at least as likely to be used by things that are fluid assemblages as they are to use them. This is the basic dynamic of surveillance capitalism, in which users are primarily raw material resources rather than customers (Zuboff, 2016).

Multiinstability

This dynamic customization is a key aspect of fluid assemblages, one we point to with the concept of *multiinstability*. This concept builds on "multistability" from postphenomenology, the idea that people are able to choose to relate to technologies in different ways and for different purposes (Ihde, 1990). For example, a hammer can be used to drive a nail into wood, but it can also be used as a doorstop, paper weight, weapon, art object, and any number of other creative purposes. Multistability emphasizes human agency and intention in human-technology relations. However, when it comes to fluid assemblages, agency in shaping these relations comes from not only the human side. While humans can always choose to some extent how to relate to things[3], fluid assemblages also actively adapt themselves to particular humans and other contextual variables. An app such as Spotify will show up differently for different user accounts, in different countries, at different times of day, and so on. The versions of things that show up are also frequently serving as tests being run on the users against specific metrics: multiple versions are deployed live and at a massive scale in order to gauge which version is 'best' according to some desired target. Users of Spotify choose how to relate to and use it, and it is this human-technology relation that is in focus in postphenomenology through its concept of multistability. But Spotify as a system also 'chooses' how to present itself and relate to particular users – even using them as unwitting testers and as precisely-specified products served to advertisers in particular moments when they are deemed to be most receptive to particular kinds of content (see, for example, https://spotifyforbrands.com). Human-technology relations in this case have multiple possible stabilities – which can also be seen as *in*stabilities – on both human and non-human sides. The concept of multiinstability adds this other non-human angle and expands the typical focus on human experience to consider the ways in which things, too, can relate to those who 'use' them. Again using the example of Spotify: we need to investigate not only how people choose to relate to and use Spotify, but also how Spotify presents itself in particular ways in relation to particular user profiles. Variations are expressed not only in and through human experience, but also in things themselves.

Multiintentionality

One of the most fundamental and significant differences between fluid assemblages and more traditional objects of industrial design is that they entail ongoing relations between 'producers' and 'consumers' (or 'users'), and this is in fact key for how they generate value. There is of course use value for end users in a traditional sense, but also value for producers in that they are able to use connected computational things to monitor, register, and encode people's everyday activities into data form. Aggregated data is extremely valuable for platform companies that now rely on it to generate real-time insights about use and users and how they might be able to ultimately generate a profit. Things that are fluid assemblages mediate everyday actions and interactions of the people who use them, and they mediate access to these people's everyday lives and attention for the companies that design and operate them. The concept we use to point to this phenomenon of multiple mediating relations and intentions is *multiintentionality*.

Building on the concept of "intentionality" from (post)phenomenology, *multiintentionality* brings into focus the multiple intentional relations that are at play simultaneously in and through things that are fluid assemblages. Intentionality in a phenomenological sense (in extremely basic terms) has to do with the directedness of a human toward whatever it is that is constituting her 'world' at a given moment (through sensations, perceptions, mental formations, etc.). In postphenomenology, technologies are added to this equation in a mediating role, such that the world that a person can perceive is made accessible through the mediation of technologies. One of the most-used tools from postphenomenology is the basic analytic schema *I—technology—world* and its variations to illustrate different patterns of intentional relations. While this is quite useful, it needs to be updated in order to adequately account for fluid assemblages. A 'technology' such as Facebook can be used to access one's mediated social 'world'. Yet it is also and at the same time used by the owner of that social media platform as a tool to access people's social activities and interconnections, by

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[3] This possibility for choice is of course much more limited in situations where people are required to use certain technologies for work or to access educational or government services, or when there are, for example, surveillance technologies in public spaces (Kallinikos, 2004). These political aspects of the sociotechnical landscape are very important to keep in mind, but do not contradict the more basic point (countering technological determinism) that humans always have some degree of agency when choosing how to relate to technologies.

advertisers as a tool to deliver marketing campaigns and assess their effectiveness, and by malicious actors as a tool to spread disinformation in order to achieve particular social effects. In the case of Facebook at least, these multiple roles have become quite present in popular media coverage and discourse; but they exist in less prominent cases as well, as the new normal in the design and operation of connected things.

The postphenomenological schema of *I—technology—world* puts humans in the center and focuses on what is present to them as their world, even as it emphasizes the co-constitution of humans and technologies (Verbeek, 2005). Multiintentionality expands this framework to consider also how technologies can mediate access to humans as the 'world' that is revealed for other actors, and often through acts of use. In fact, this model of use of things providing the mechanism for access to people's everyday activities through production of behavioral data is one of the foundations of surveillance capitalism; but it is not easily brought into focus through the traditional postphenomenological framework that focuses on what is present to humans. This is especially significant in that mechanisms of surveillance and control are typically very intentionally not revealed in acts of use. For example, in order to understand what Facebook is and does, it is not enough to look at only how particular people perceive Facebook and the world that it mediates through use (intentionality) but also at how Facebook mediates access to these users for others (e.g., advertisers, political campaigns) through their platform (multiintentionality). Getting to grips with what contemporary connected things are actually doing demands serious attention to multiple simultaneous roles, relations, mediations, and intentionalities—not to mention intentions.

New sites for design innovation

The concepts we have briefly sketched out here are in no way comprehensive in terms of accounting for fluid assemblages and the dynamics surrounding them. However, they do at least give us a decent foothold in identifying what seem to be key characteristics, which also allow us to begin to identify corresponding sites and possible practices of design innovation in relation to them. Especially, and drawing on our continued commitment to human-centered design (and the new forms it must now take), we can use *multiinstability* to note that the customization of things for particular users and contexts is a significant dimension of the design and function of things that are fluid assemblages, and one in which people using them could be given more agency. Similarly, current practices tend to use interfaces to conceal what is really going on with and through things, particularly in terms of data being collected and used for particular purposes; there could be a design opportunity here to make this more meaningfully transparent (extensive terms of service agreements clearly not meeting this descriptor). This would undermine what have become typical business models, but also provide an opportunity for differentiation in a space where many people are increasingly concerned and wishing for alternatives. If data collection and use were transparent and could provide clear benefits, people might even be willing to provide more and *better* data in a model that is cooperative rather than shady and manipulative. And certainly more possibilities for exploration could be added to this initial list.

These possible sites for innovation require new types of design practices. Current sources of innovation in this space often come from sophisticated marketing efforts and engineering-oriented optimization, while design provides the user-facing shells. But these shells seem to be increasingly brittle, as awareness of "dark patterns" of interface design and rampant data collection indicate that things are not entirely what they seem. Rather than innovating through tuning the dialog boxes that discourage users from understanding or caring what is going on, there could be an opportunity in designing to actually reveal and manage all of these relations and processes and types of value head-on and in a good way. And while these are matters that can show up at the surface of things, we argue that we actually need to start much deeper.

Toward new design practices

If we take a closer look at the conceptual frameworks and methodologies of the disciplines that made it possible for fluid assemblages to emerge, such as object-oriented programming, massively parallel and networked computing, sensors, and increasingly technological developments such as machine learning and artificial intelligence, they all, to some extent at least, engage in issues pertaining to ontology. For instance, unless you decide and specify what the 'world' is made of, you cannot develop computational principles for dealing with it, and this ranges from having to precisely define what category and kind a given variable is, to defining exactly what set of variables to work with. As restricted or inventive as such matters may be, it still puts development in close contact with what we could call ontology, and thus the need to constantly pay attention to how categories work and behave, what they can and cannot do. Clearly, this also includes being

innovative with respect to such issues, to find new ways of defining and describing (just think of the conceptual work regarding 'relations' and 'relevance' grounding the algorithms used in search engines).

If we instead turn to design, our typical awareness of matters pertaining to ontology is much less explicit, if at all present. And while we certainly relate to categories, we typically do not have to be very explicit about how we do so. In fact, we can largely rely on this being a non-issue: when we are designing a vehicle we find comfort in the notion of 'cars'; when working with an office setting, we rely on notions such as 'chair', 'table', 'cabinet' etc. being there for us to navigate the design space. Much of what we traditionally do is to renew and refine – but not *replace* – such categories.

And so let us take a very brief look at what happened when we had to design for a new category that was not there before, and for forms of use we were not already used to: the personal computer. Transitioning from the programming environments that used to characterize what using a computer was like, the invention of the graphical user interface was an enormous breakthrough with respect to accessibility and ease of use. And to achieve this, the strategy was again to build on existing categories: the file and document, the folder and filing cabinet, the trash bin… Faced with the need to come up with an ontology, we persisted in our practice of renewing and refining, but not replacing. The notion of an 'information appliance', or now more commonly 'app', is unfortunately not much different: an application is "a program (such as a word processor or a spreadsheet) that performs a particular task or set of tasks" (https://www.merriam-webster.com/dictionary/application). It focuses our attention on that special purpose we intend to act upon as we pick it up, not its interconnectedness and its massive exchange of data across activities and areas we perhaps do not even see as related.

We believe this attitude of seeing new technologies in terms of old categories is approaching a breaking point in the context of fluid assemblages, much like industrial production eventually came to a point where one could not just continue to imitate what was previously made by hand. Certainly, much can still be achieved (or, more cynically, gotten away with) in terms of acceptance and ease of use by using familiar forms, but it is increasingly obvious that this approach also hides much of what is actually going on. To use the phrase coined by early industrial designers in their critique of mere imitation, this approach is not 'true' to the materials and forms of production we are now working with. This insight is motivated by a range of observations that can be made about current sociotechnical realities: from the simple but still far-reaching insight that 'deleting' something does not mean it is gone, to the uncanny feeling of a widening gap between what I think I'm doing with an app (e.g., using an app to check the weather) and what is actually going on that involves detailed tracking of my movements to harvest data that can be sold to other parties (Valentino-DeVries, Singer, Keller, & Krolik, 2018). Managing one's exposure to dataveillance (Raley, 2013) is also a relatively new category of 'task', and one that is typically (and intentionally) not well-supported by current applications.

Conclusion and future directions

To move on and find new ways of designing the continuous tuning of increasingly complex relations between us and the technologies we live with, we strongly believe design scholarship and practice must start to pay attention to ontology in ways they have not up until now. We also need to create a shared discourse between design and technology regarding algorithms as literally a new design material and design partner (Finn, 2017). Design researchers and practitioners have been working with 'conceptual design' for a long time, but this will now take on a partly new and much more central meaning and role. We depend on design philosophy to lead the way here: not as critical reflection from a distance after things have already been made, but as part of new ways of designing that consider doing philosophy part of a vital design practice, rather than its antithesis.

Acknowledgements

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Towards a Tangible Philosophy through Design: Exploring the question of being-in-the-world in the digital age

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The combined philosophy and design approach called Philosophy-through-Design (PtD) is proposed using an exemplary project about being-in-the-world in the digital age. PtD is a practical way to do philosophy through designing interventions, and involves various people in the exploration of philosophical concepts. It stems from the overlapping questions found in philosophy and design regarding human-technology interaction. By intertwining both, they benefit from describing, understanding and proposing human-technology interactions to unfold new questions and perspectives. In the exemplary project, being-in-the-world refers to a way of being that is embodied, active, open-ended and situational, based on the phenomenological and embodied theories of Tim Ingold. This concept questions what it means to be human in the digital age and how our lives with technology are built. The first results show the process of weaving together observation, creation and reflection, which presents Philosophy-through-Design as a promising method for designers to practice a tangible philosophy.

Keywords: Philosophy through Design, Tim Ingold, Embodiment, Practical Turn, Interaction Design

Introduction

The aim of this paper is to elaborate the combined philosophy and design approach that we will call Philosophy-through-Design (PtD). Philosophy-through-Design, as developed in this project, is a practical way to do philosophy through the design of interventions, and aims at involving a range of different people in the process of exploring philosophical concepts that are of importance in their daily lives. The approach is a way of exploring a philosophical question from the everyday practice using the practice of design. It combines both qualities of philosophy and design in order to act as a tangible way of doing philosophy.

The development of PtD stems from the overlap in the kind of questions found in both philosophy (of technology) and design (Eggink & Dorrestijn, 2018; Hauser, Oogjes, Wakkary, & Verbeek, 2018). These questions are about how humans and technology relate to each other in the past, the present and the future. Designers might try to find solutions to the problems related to these questions and philosophers might try to understand why, but both can benefit from describing, understanding and proposing new ways in which technological solutions interact with the societies in which these solutions are used (Eggink & Dorrestijn, 2018; Findeli, 2010; Hauser et al., 2018; Ingold, 2011).

Starting from this overlap, in both philosophy and design a development can be found to make use of the knowledge and methods existing in the other field of inquiry (see figure 1). In philosophy, the empirical turn marked a shift to bring philosophy more into practice by taking part in and analysing real-world case studies

(Achterhuis, 2001; Verbeek, 2005). In the design of interactive and use products, a trend can be found of applying philosophical insights and taking the human being and society into account in the design process (Dorrestijn & Eggink, 2014; Hummels & Lévy, 2013, Tromp, Hekkert, & Verbeek, 2011). However, PtD differentiates itself from these two approaches by intertwining both processes into one approach guided by a philosophical research question. At the start of the approach there is no predefined perspective regarding the research question in the form of neither philosophy nor design. The questions, creations and reflections found during the approach will interact with each other to develop and contribute both to the field of philosophy and design, not by finding answers, but by unfolding new questions and new perspectives.

In this paper, we will elaborate Philosophy-through-Design by an exemplary project in which the philosophy of Tim Ingold is used to investigate his concept of being-in-the-world. Ingold's ideas pose interesting questions in a society in which digital products take up such a ubiquitous presence in everyday lives and experiences. As a starting point, we will focus on the iconic object that is omnipresent today: the smartphone. The aim of this project is, thus, to question what Ingold's philosophy means in the context of the digital age, using a project revolving the smartphone as a design case to understand our being-in-the-world in the digital age. First, we will offer some background to PtD by relating it to other methodologies, such as empirical philosophy and Research-through-Design. We will then move on to the philosophical background by introducing the philosophy of Tim Ingold and his conception of being-in-the-world. After that, we will introduce the case study of the smartphone and the digital age and elaborate on the focus points, questions and steps we have chosen to guide PtD. Finally, we will provide an overview of the first results and elaborate on them in the discussion and conclusion in light of the validity of Philosophy-through-Design as a method for doing philosophy hands-on.
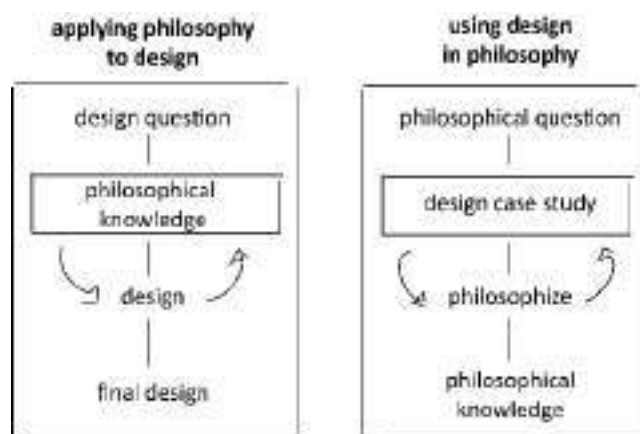
Figure 1: Schematic overview of applying philosophy to design and using design in philosophy

Philosophy-through-Design background

PtD could be considered as connected to the empirical turn and the developments in the field of Philosophy of Technology that came afterwards. PtD indeed acknowledges a similar beneficial relationship between philosophy and design, however, PtD differentiates itself from the empirical turn in a subtle, but substantial way. With the empirical turn, philosophy became more concrete by incorporating more case studies and collaborations with other disciplines (Achterhuis, 2001). This turn opened the way for philosophers to 'come down from their ivory towers' and create philosophical tools, methods and forms of assessment to use in practice and apply in other disciplines, such as design (Eggink & Dorrestijn, 2018). By making philosophy empirical, however, the new approaches are criticised for losing their critical and ethical qualities in the concreteness (Scharff, 2012; Winner, 1993).

A variety of initiatives to bring these qualities back after the empirical turn are proposed, together considered as an "ethical turn" (Brey, 2010; Verbeek, 2010). Eggink and Dorrestijn (2018), in line with Verbeek's (2010) proposal of philosophical accompaniment in technology development, go even further by proposing the "practical turn" in which philosophers and designers collaborate by applying philosophical theories and methods in a design context after which the design project can lead to a better understanding of Philosophy of Technology. In other words, the designer profits from a more reflexive perspective on their designs, while the

philosopher uses the design of actual things as a way to test philosophical frameworks in practice (Eggink & Dorrestijn, 2018). The difference with both the empirical turn and the practical turn is that in Philosophy-through-Design, it is not a philosopher doing the philosophy while watching a designer design, but a designer practicing a form of tangible philosophy through the design of things. The outcome of a PtD project is thus not necessarily an abstract philosophical concept, idea or question, but a tangible artefact. PtD aims not to analyse material things in a philosophical way, but PtD explicitly intends to materialise philosophy.

Philosophy-through-Design might sound familiar to the well-known design research methodology Research-through-Design (RtD) (Faste & Faste, 2012; Findeli, 2010; Frayling, 1993) in which it is acknowledged that designed artefacts can embody an answer to a research question (Biggs, 2002; Faste & Faste, 2012). PtD can be seen as a specific way of executing the 'design' part of an RtD project. RtD, as shown in figure 2, can be described as design activity that operates as research (Faste & Faste, 2012): a general research question is answered with a design project, which in turn can form a partial answer that reflects back on the research question (Findeli, 2010). Philosophy-through-Design has a similar aim but specified for a philosophical question and offers an approach in which philosophy can inspire the design process not only as starting point but throughout the whole project. The design informs, thus, the philosophy as much as the philosophy informs the design *simultaneously*. As shown in figure 3, the philosophy and design perspectives are *interwoven* to develop further, not to a final design answer or philosophical answer, but to new questions and new perspectives.

Figure 2: Schematic overview of Research-through-Design (adapted from Findeli, 2010)

Figure 3: Schematic overview of Philosophy-through-Design in relation to RtD

Philosophical background

The design case, chosen for this PtD project, is about being-in-the-world in the digital age as inspired by the ideas of Tim Ingold (2011). Ingold is originally an anthropologist, but hi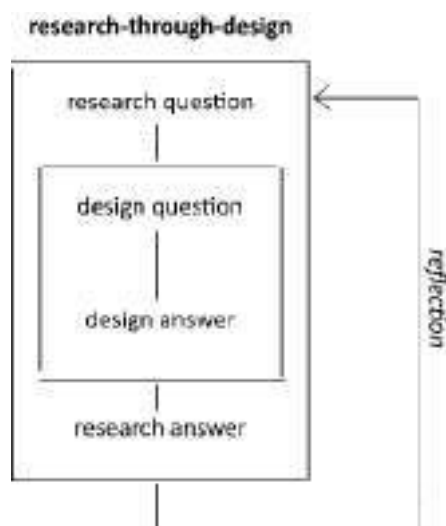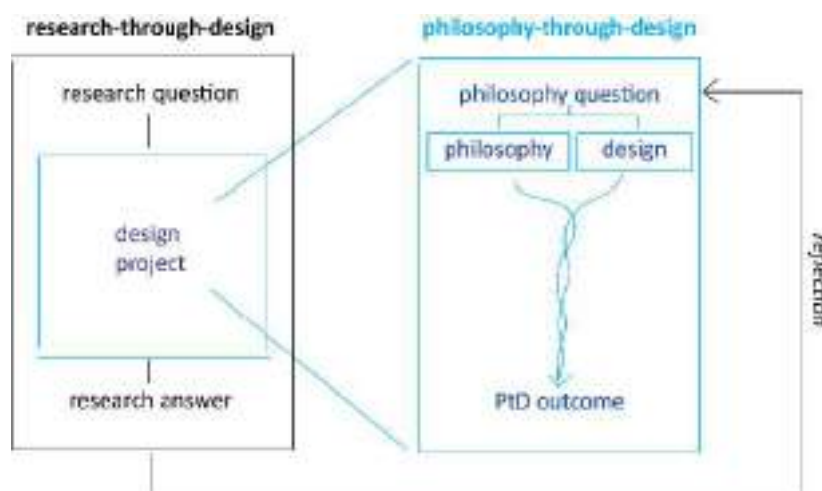s thinking has transformed into a philosophy about art, architecture and anthropology, or rather a philosophy of what it means to be alive. He is influenced by many philosophers and thinkers that are associated with the idea of being-in-the-world. The term itself was introduced by the philosopher Martin Heidegger (1927), but has in different terms influenced others in the philosophical movement of phenomenology, such as Merleau-Ponty (1962), and other thinkers in the theories of embodiment (e.g. De Jaegher & Di Paolo, 2007; Suchman, 1987; Varela, Thompson, & Rosch, 1996). The ideas of phenomenology and embodiment have also spilled over to other disciplines such as human-computer interaction (e.g. Hollan, Hutchins, & Kirsh, 2000) and interaction design (e.g. van Dijk & Hummels, 2017; Van Dijk, van der Lugt, & Hummels, 2014). As a result, Ingold's theory about being, life and anthropology comes from concepts such as thinking through practice (Schön, 1983), the coupling of action and perception (Gibson, 1979), and skilled practice and situated actions (Suchman, 1987). Ingold then developed his own by using terms such as *wayfaring*, *weaving* and *the meshwork*.

According to Ingold, our being is a dynamic being that is always moving, learning and developing in the forcefields of its environment. The world is a *meshwork* of all the interwoven lines of life, growth and movement of all the beings and things occurring there (Ingold, 2011, pp. 63-94). It is not a platform on which beings live, rather beings emerge in a world-in-formation, along the lines of their relationships (ibid, pp. 63-75). Referring to phenomenology, consciousness is not confined in the head, but spills over into the environment along these pathways of sensory participation (ibid, pp. 51-62). In other words, Ingold talks about *weaving*: our being is woven together from all the different influences that occur in our lives (ibid, pp. 63-75). If every story would be a thread, being alive means weaving all the stories of your life together into one being. To know something, is to know its story. It is by this continuous process of following and creating stories that we acquire knowledge and live in the world. Ingold calls this trail-following *wayfaring*. Wayfaring requires an open attitude, improvisation, sensitivity to cues, and a capacity to respond with judgement and precision. The difference between an expert and a novice is not how much they know, but how well they are able to skilfully act in the meshwork of storied knowledge (ibid, pp. 141-175). From the concept of action-perception couplings, learning is accomplished by trying over and over again and following the stories of exemplars to copy their gestures (ibid, pp. 177-226). Therefore, the condition of being-in-the-world, to Ingold, calls for more than immersion and being involved: it calls for an openness to observe, to be active, and to be astonished by the world we inhabit (ibid, p. xii).

Based on these ideas, being-in-the-world, in this project, will refer to a way of being that is embodied, active, open-ended and situational. It is about the possession and mastery of skills to be able to react appropriately to all the influences within the flow of the process. Decisions are made unconsciously by following the traces without being paralyzed by possible consequences and having to make a decision. It means that the human is inseparable from the world in which it lives and is always moving in, reacting to and creating with the situations it is in. This conception raises an interesting question in the digital age, where new technologies shape an apparent division between online and offline practices and close off people's movements, reactions and creations from the bodily sphere. How can we understand this division? How do these two contexts relate to each other? Do they replace each other, do they augment each other or have they become so intertwined that we are alienated from and lost in understanding the world in which we live? What does the term being-in-the-world, our way of being human and our world, then mean?

Case study: being-in-the-world in the digital age

The digital age refers to a historical period in the 21st century characterized by a rapid shift to a society based on information and networks (Volti, 2014). Connection is a keyword, since anyone with any type of access to the digital world can potentially reach anyone who is similarly equipped almost instantaneously (Volti, 2014). As philosophers and designers, we may ask what the digital age actually means to the people who are living in it in their everyday lives and what an improvement or change of the digital age could, or perhaps even should, look like. In this context, the digital age points to the way people live and communicate with each other in a world that has been augmented by new digital technologies. With 'digital', we specifically refer to the invisible, complex and distributed processes that occur all around us, of which most of us can only perceive and understand small parts (Schiphorst, 2007). The hiddenness of much of the digital processes poses problems on our everyday lives such as a loss of privacy, misuse of data and jobs taken over by AI.

Nowadays, the digital world can be accessed through different interfaces, such as your smartphone, your laptop or tv. All of which have their own influence on how the world is experienced. The focus in this project will be specifically on such an interface, rather than focusing on a wide-ranging conceptual problem such as privacy or big data. The interface of the smartphone is chosen specifically, because the introduction of the smartphone marks the start of a new phase in the digital age. The smartphone is an interesting object as it is both a physical device that we carry around with us as well as an access point to what we call the digital world. In just a few years' time, it has become the dominant device with which we are digitally active (Deloitte, 2018; Kemp, 2017), changing how we go through our day to day lives, and changing the kind of digital content and digital activities that are available. In 2017, about 66% of the global population used a mobile phone and about 37% of people use social media at least once a month, of which more than 91% of them via mobile devices (Kemp, 2017). By being easy to use, small and portable, the smartphone is blurring the lines between our digital and physical practices. The average number of hours spend on the internet each day in the UK is 5h47 of which 1h48 on social media alone (Kemp, 2017). This makes the smartphone an interesting object to inspect more closely in relation to theories on embodied being-in-the-world, since it allows us to focus on the transition between the digital and non-digital and how the design influences in what manner this relation is experienced and understood.

There are many reasons why the smartphone could have become such a dominant device in society today. It carries all different kinds of tools; our clock, dictionary and more into one device. It makes it easier to stay in touch with friends and family from near and far and makes us more flexible in how we go through our daily lives. However, the extensive use of the smartphone is related to multiple negative effects regarding both mental health (e.g. Alhassan et al., 2018; Elhai, Dvorak, Levine, & Hall, 2017), and physical health (e.g. Jung, Lee, Kang, Kim, & Lee, 2016; Korpinen & Pääkkönen, 2009), affecting social skills and dependency (e.g. De-Sola Gutiérrez, Rodríguez de Fonseca, & Rubio, 2016), and influencing happiness, social connectedness and life satisfaction (e.g. Alter, 2017; Schnitzler, 2017). These problems pose an interesting problem for designers to look for solutions on how to improve the design of the smartphone to help people to be better equipped to move through a world that incorporates both digital as well as physical practices. This could be done for example by changing the physical design or adding new modes of interaction as done by Stienstra, Overbeeke and Wensvee (2011).

From the perspective of philosophy, the problems linked to smartphones pose different questions. Looking specifically from the ideas of Ingold (2011), the interface of the smartphone makes our experience of the world more ambiguous. Since the whole body is involved in our being (Ingold, 2011, pp. 15-62), how does that apply to the use of the smartphone which offers this immense non-bodily world to us? Ingold offers the example of using a saw to talk about (1) how tool use is not an operational sequence of small tasks, but of processional movements that inform the next move, (2) that using does not entail the attaching of an object to a body, but of joining a story to the appropriate gestures and (3) how the movement of tool use comes from feeling what you are doing by coupling perception and action with concentration (Ingold, 2011, pp.51-62). The question is, however, how the smartphone fits into this picture, when the design of the smartphone seems to have evolved into a more indistinguishable shape that leaves no variety in how we use and experience it. When the bodily gestures to talk to our friends, to follow the news and speak in public are all the same, and our concentration to feel the flows of movements around us, in both the physical and the digital world, is constantly challenged by notifications, sounds, vibrations, and moving images; how then, can we be in the world?

The philosophical question for this project is, thus, formulated as follows: '*What does being-in-the-world mean in a digital age dominated by smartphones?*' To translate this question into a design question, the question is reformulated so that it asks for a change in how users interact with their smartphones to understand their experience, and is posed the following: '*How to stimulate users to have more agency in being in a digital age dominated by smartphones?*' Agency in this case means, referring back to the conception of being-in-the-world by Ingold (2011): being able to make the right decision right away based on experience and skill. From these questions and the aim of PtD, the design goals in this project are to design three physical smartphone interventions that will:

- make clear the role of the smartphone in the daily lives of users
- stimulate agency in users to do what they really want to do and to be who they really want to be
- start a conversation about being, agency and the world in relation to the smartphone

The Philosophy-through-Design approach

In PtD, the design of interventions will function as both tools for thinking and traces of knowledge acquirement. Both the philosophical and design question will guide the exploration and work together through a few stages (see figure 4). The stages are (1) First Person Exploration, (2) Experience Conversations and (3) Design Conversations. In every stage, reflection plays a key role in guiding the next steps. The design researcher, to keep track of their ideas and reflections, will keep a notebook that will in the end serve as a visual trace of knowledge acquirement during the project.
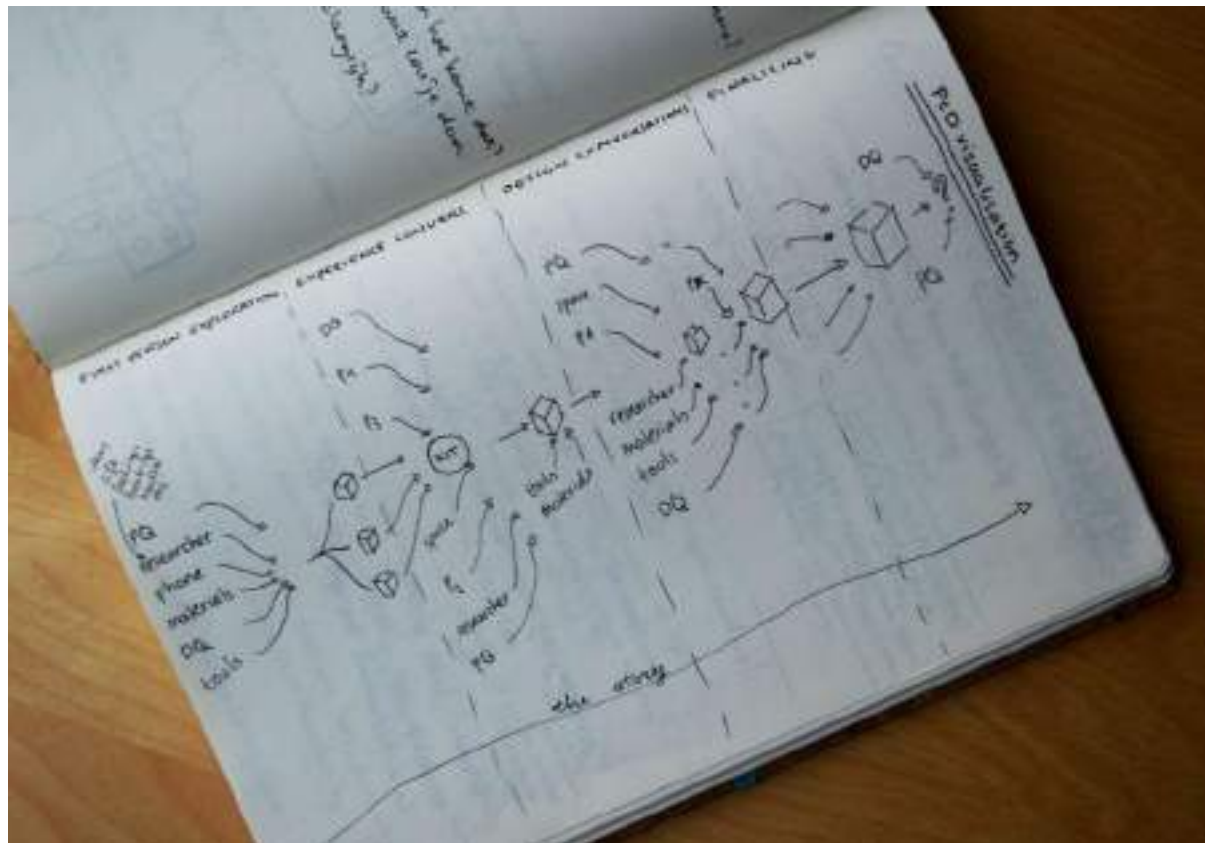
Figure 4: Schematic overview of the PtD process taken from the researchers' notebook

Stage 1: First Person Exploration

The process starts with the design researcher exploring and describing their personal felt-experiences about the philosophical question. This method is based on first person methodologies in embodied theory and somatics (Höök, 2010; Schiphorst, 2007). The method of these explorations consists of a few activities: (1) describing the personal experience, (2) designing and making interventions, (3) using the interventions, (4) describing and reflecting on the personal experience of using the interventions in regard to the design and philosophical question and (5) formulating a personal answer to the philosophical question.

The focus on individual experience is taken up specifically in first-person methodologies and somatics. In these methodologies, knowledge is accessed and constructed through the body and requires that experience be directed through awareness (Schiphorst, 2007). The body-in-motion and its felt-experience are the source for exploration and it can include an autoethnography in which the author provides a detailed description of their experience (Höök, 2010; Schiphorst, 2007). The idea is that we can learn from our own specific practices and use the qualities to transfer them into more general knowledge (Höök, 2010). In this specific project, the main design researcher will start with an autoethnography of their smartphone behaviour. The autoethnography will be supplemented with the making and using of interventions to make certain uses and aspects of the smartphone more obvious and conscious. From this autoethnography certain qualities about smartphone use can be distracted.

The *making* of artefacts, which intervene in our own habits, serves to engage the design researcher to explore their habits more in-depth. Making for exploration is a common method in the design process which is characterized by ambiguity and a lack of planning, but functions to engage the designer in a reflective dialogue to catalyse the decision process. It brings together the stories and materials to perform as incentive for understanding (Frens & Hengeveld, 2013). Hummels and Lévy (2013) reveal design not as a process of problem solving or organisation, but as a process of opening up, exploring new horizons and engaging in new situations. Through the embodied acts of making, building and experiencing prototypes, makers can exploratively facilitate access to and express meaning of the everyday to guide new directions to take. They share with Ingold (2011) that the act of making enables designers to explore the unknown, guided by their practiced intuition and sensory capabilities in a dialogue with the materials and the world around them. Thus, through describing, making and using the design researcher creates a personal answer to the questions to make certain qualities of the smartphone explicit.

Stage 2: Experience Conversations

In the second stage, the design researcher will take the third-person perspective by involving other participants by inviting them to use one intervention for a set amount of time. The interventions are handed over to the participants in a kit containing the intervention, small assignments and means to make notes. Inspiration is taken from Gaver, Dunne and Pacenti (1999), who used cultural probes to research the lives of elderly communities without dominating the conversation. They found that through the informal style of communicating and research, they were able to familiarize and connect with the communities in an appropriate manner that lead to both inspiration and grounded knowledge to base design decisions on (Gaver et al., 1999). Similarly, in Philosophy-through-Design the design researcher aims to engage with the participants to start a discussion about their smartphone use and the impact on their daily lives.

After using the kit, the design researcher will have a one-on-one conversation with the participant about the experience of using the intervention and their insights regarding their being-in-the-world in the digital age. The interventions serve in this conversation as a tool for thinking (Kirsh, 2013; van Dijk & van der Lugt, 2013) and joint sense-making (De Jaegher & Di Paolo, 2007). As recognized in the theory of distributed cognition, the body and its surroundings can be incorporated in the process of thinking (Hollan et al., 2000; Kirsh, 2013). The handling of the intervention as a 'cognitive scaffold' can lead in conversation to shared insights between participant and design researcher (Van Dijk & Van der Lugt, 2013). The interventions in the PtD process will in this way serve as objects to think, to build an understanding of their experience and start a discussion in which an answer to the philosophical question can be formed.

The reflection and analysis of the data is inspired by the Interpretative Phenomenological Analysis (IPA) approach (Smith, Flowers, & Larkin, 2009). IPA is a qualitative research approach that examines how people make sense of their personal life experiences. Offering a systematic way of analysing them makes this approach phenomenological and hermeneutic. The IPA approach is specifically interested in major life experiences that make people more aware and reflective of the significance and meaning of what is happening (Smith et al., 2009). In Philosophy-through-Design it is not a major life experience that will bring people out of their daily flow of (unconscious) experience, instead it will be an intervention that will disrupt their smartphone use leading to awareness and reflection, with which the design researcher can engage.

Stage 3: Design Conversations

In the third stage, the design researcher will iterate further on one intervention and improve it according to the results of the previous stages. Again, participants are invited to use the new intervention to fuel conversations about the design question and the philosophical ideas behind it. The discussion will guide the next step in the design process where the participants are also invited to help to improve the design together with the design researcher. In this stage, the first two stages will be brought together to create meaning through conversations, joint designing with regard to the question of being-in-the-world in the digital age.

Taken from participatory design (PD), PtD aims to use design as a method for mutual learning between participants and design researcher through reflection-in-action (Garde, 2013; Robertson & Simonsen, 2013). Important values in PD that are also applicable to PtD are (1) cooperative design, (2) equal and democratic (power)relations, (3) situation-based actions & design and (4) the use of tools and techniques to help participants (Garde, 2013). In one sentence these qualities ensure that in PtD human activity is examined in its context productively and ethically in cooperative and equal partnerships (Garde, 2013; Spinuzzi, 2005). The

difference between PD and PtD lies in the outcomes of the process, where participatory design desires to learn the aims, context and design ideas of the participants to design a solution, instead the PtD process desires to use the unfolded aims, context and design ideas to start a conversation and explore a philosophical concept.

The results of the design conversations will be discussed and reflected upon to come to an answer to the design question with a final intervention. The created interventions during the whole process together with the researchers' notebook serve as data to show the story of how the research has developed to new insights about being-in-the-world in the digital age. This story of things and insights will serve as the tangible philosophy with which philosophical ideas, questions and perspectives will be constructed for further research.

First results

At the point of writing this paper, the first stage 'First Person Exploration' has been completed by the main author. In the present and the subsequent section, the pronoun 'I' will be used to describe the subjective experiences of activities executed during PtD. During the first stage, the design researcher has analysed their own smartphone behaviour, designed three interventions (see figure 5a-c), used them and reflected on them. In figure 6, an overview of the process can be found including pictures of their researchers' notebook, an autoethnography booklet, the creation of the interventions and their use.

Figure 5a-c: The interventions, (a) Pink Screen, (b) De-distractionizer, (c) In-touch

The first intervention is the 'pink screen' (see figure 5a). This is a phone case made from pink felt that can be folded around the smartphone. When opening, the felt forms a screen that makes a clear division between the smartphone user and the situation they are in. It is designed to amplify the 'I am not here, but in my phone'-effect when using the smartphone, but turned out to be a message to bystanders to not disturb. The second intervention is the 'de-distractionizer' (see figure 5b). This is a machine that protects from unfiltered and distracting stimuli of the smartphone by simplifying the options of what to do without a smartphone. It uses the same casino effect as many applications to keep you interested by blinking and randomly picking a task when you put your smartphone on top of it. In the beginning it was new and funny and helped me to check my smartphone less, but I quickly found a way to hack the system, making me uncomfortably aware of my lack of agency in my smartphone use. The third and last intervention is the 'in-touch' (see figure 5c). This is a multisensory phone case that feels soft to the hands, makes sounds when you shake it and you can dig your fingers in it. It challenges the boring smartphone design by making your smartphone fun to play with in a bodily sense, and invites you to not only stay digitally in touch with others, but also to keep in touch with your different senses to build a more positive relationship to the smartphone itself. During the use of this intervention, I found, not to my dislike, a playful side of myself not only in how I played with the intervention, but also in how I engaged with my friends face-to-face.
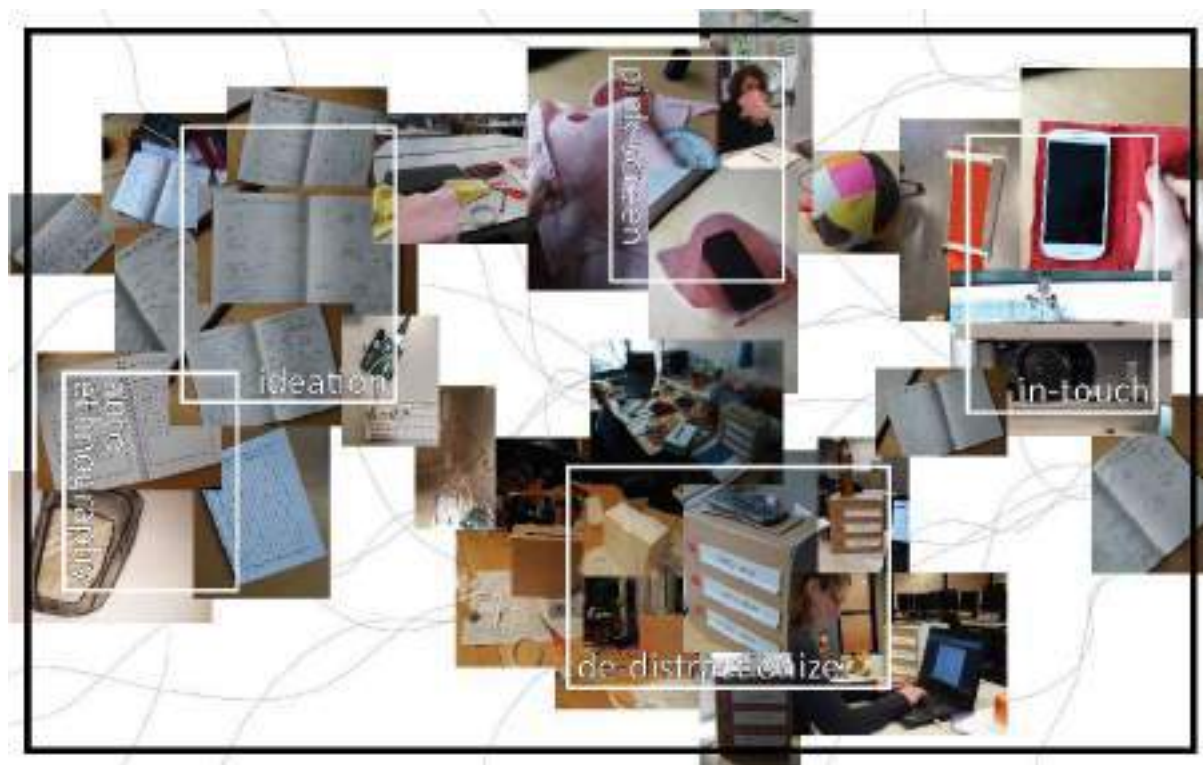
Figure 6: Overview of the process of stage 1, First Person Exploration

The personal experiences and reflections regarding the use of the interventions have been tracked in an autoethnography booklet. From this data, I found that, (1) regarding the design question, on the long term, an intervention that requires me to have self-discipline in using it, such as the de-distractionizer, will not help me to have more agency in my smartphone use. Old habits seem to take over quickly and hacking the system was a common occurrence. The intervention that actually made me feel to have more agency was the pink screen, because it helped me to focus better on the situation I was in, be it physical or digital. In light of Ingold's theory (2011), I was more tuned in to the current situation to be able to react appropriately to subtle cues to follow what is going on. Regarding the philosophical question (2), I realised that my being-in-the-world is a constant paradox. I am attentive of everything at the same time, but as a result do not have any real attention for the present moment. The digital seems to be embodied in me, while my being in the digital is disembodied. As a result, my online identity is filtered to what can be digitized and does not feel like me, but is at the same time shaped by the unfiltered stimuli and practices from the digital world. Overall, it seems that my world and my role in it are overwhelmingly vague, and making sense of it has become a full time job that distracts me from actually being attuned to the moment. My being-in-the-world, in opposition to what Ingold describes (2011), is in the digital age, thus, closed by an abundance of unfiltered cues and scattered attention, so I am less open to be astonished by the world.

Discussion

The first stage of Philosophy-through-Design showed how philosophy and design were interwoven to both inform the process simultaneously. By actually using and reflecting on the designs as first user, I found new problems, ideas and questions that made me return to philosophy. When I was using the pink screen, for example, with which I had intended to make a clear division between the online and the offline world, it turned out that many people asked me if it was designed to protect my privacy. These comments did not only make me realise that the design did indeed seem to make smartphone use secretive (a *design* reflection), but it also stimulated me to dive again into the *philosophical background* to see if a connection between privacy and being-in-the-world could be found to base further exploration on in the following design stages.

By designing and making the interventions, I came to understand the theory in another light. I noticed how the different ideas, materials and people were acting as different threads that weave together into this project. During the process, I started to create a meshwork of my project (see figure 7) to understand how my

development had travelled, or to use Ingoldian terms: *wayfared*. Ingold (2011, p. 240) would claim that a researcher is at any time following traces from the past and projects themselves into the future along lifelines, forming their own self along the way. An example is that the creations of the interventions were for a great part influenced by the available materials, tools and skills I had to learn. At some point, the sewing machine broke and I had to find another way to create an intervention, which changed the design and therefore also how I approached the question of being-in-the-world. In many design projects, however, the final design is often presented as the perfect embodiment of a function or idea, when in fact it came into being as a weaving pattern of different ideas, available materials, tools, experience, etc. Philosophy-through-Design makes this weaving of different influences more explicit, to be philosophized about, and is in that way also inspired by Ingold's ideas of being-in-the-world and knowledge acquirement based on exemplars, experience and mastery of skills.
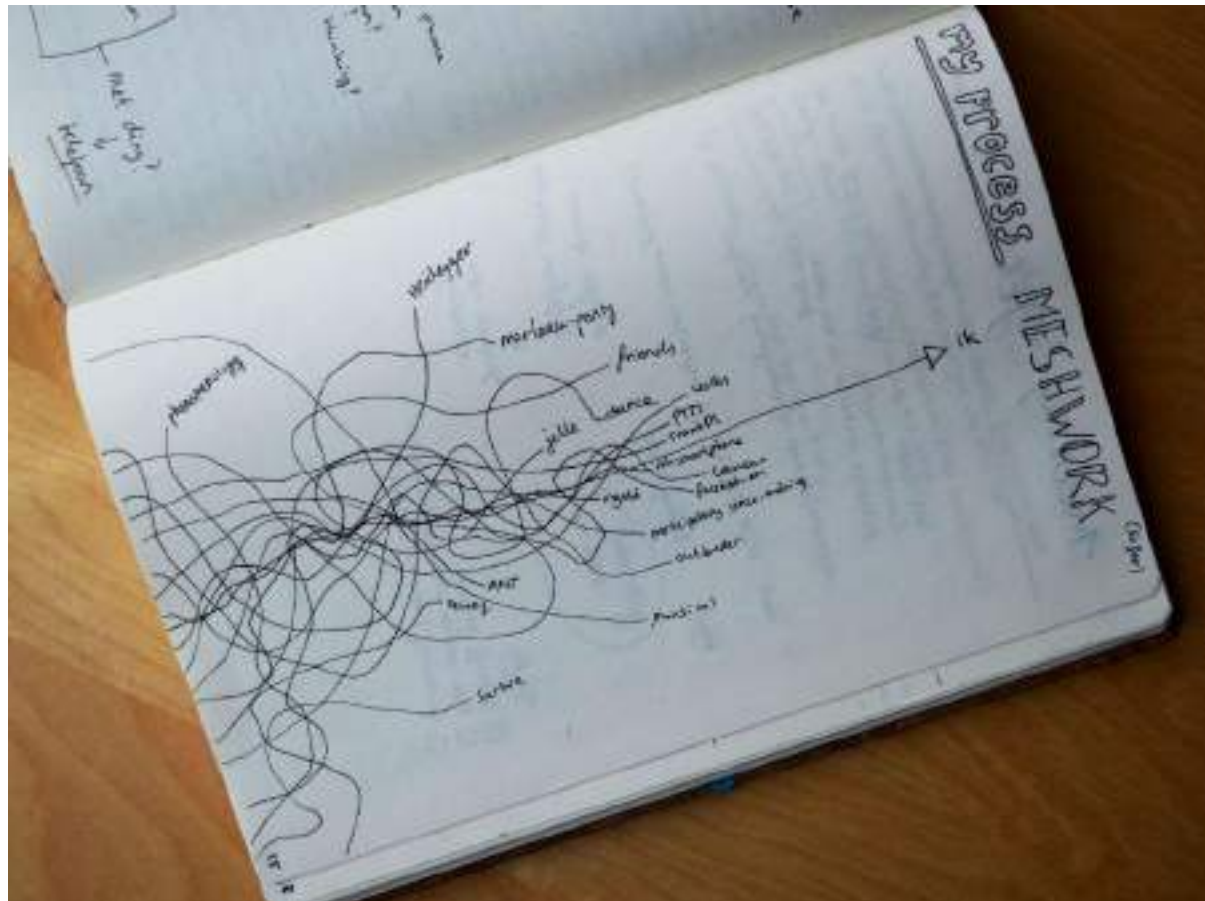
Figure 7: 'My process meshwork (so far)' taken from the researchers' notebook

Limitations

A limitation one could offer to PtD is how the design of the interventions, and with that the personal opinions and abilities of the designer, could determine the course of the philosophical exploration, alongside their already existing explicit influence and experience as a first user of the interventions. However, the idea that academic endeavours and science as a whole could be objective, is exactly the point that PtD, in accordance with Ingold's thesis (2011), tries to overcome. Science and knowledge building are more akin to a form of craftmanship, where the researcher joins the flows of materials, people and circumstances to compare, understand, describe and move with the different ways of being (Ingold, 2011, pp. 226-240). The specific design will always influence the course of the project, but that does not have to be a problem. The involvement of other people in PtD is, therefore, a way for the design researcher to engage with other opinions. It is, thus, of importance that the design researcher, independent of their own beliefs, opens themselves to the world they study.

Related to this point is the question if PtD can actually be called to be a form of philosophy. Philosophy is in this project, similarly, not seen as an objective academic endeavour, but as a personal philosophy, or in other words: a way of life that could be practiced by anyone. This view on philosophy refers back to the Hellenistic and Roman eras where philosophy meant a mode of existing-in-the-world (Hadot, 1995). An associated view can also be found in the ideas of Dewey (1917), the father of the philosophical school of pragmatism. Dewey acknowledged that one would never be able to realize complete wisdom as a definitive state or to find the real truth, and so philosophy should abandon the project of finding certainty and create theories, but instead to practice philosophy from the everyday so it can guide actions and ways of life at every moment with participation of the layman (Dewey, 1917). Philosophy as a way of life, in accordance with the ideas of Ingold (2011), is not about studying philosophy, but it is about living it (Hadot, 1995).

Looking back, however, at Ingold's presentations of what a study from within the world (Ingold, 2011, p. xi) would look like, it seems to remain limited to a number of examples (such as sawing through a plank (ibid, pp. 51-53)) and various drawings in between the lines of text. Philosophy-through-Design aims to be the first step into the direction where Ingold's ideas will be put to the test by working them out in a more considerable design project. Further research could look into the possibilities of philosophers using PtD, in their own way, to practice a tangible philosophy in the world. This project about being-in-the-world in the digital age is, however, an example of what such a project could look like from the perspective of a designer, by using the ideas of wayfaring, stories, weaving and embodied situational practices to *do* philosophy.

Conclusion

The Philosophy-through-Design approach, as developed during the case study about being-in-the-world in the digital age, proposes a relevant method in which design can function as a way to materialise philosophy. Or in other words, to bring abstract philosophical inquiries back into the everyday where an actual change can be made. By combining both philosophy and design into one approach, both can benefit from describing, understanding and proposing the ways in which technological solutions interact with the societies in which these are used. The results of the first stage of PtD show a promising process that weaves together observation, creation and reflection in the design and use of smartphone interventions. In the following stages, the approach will be taken into practice even more by involving various smartphone users to further explore the question of being-in-the-world in the digital age. In conclusion, Philosophy-through-Design seems promising as a method for designers to practice a tangible philosophy by design.

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Values that Matter: Mediation theory and Design for Values

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Philosophy of technology could bring new insights when applied to design practice. This paper brings together mediation theory and design for values. We present a new design for values methodology: Values that Matter. Via the four phases; explore, conceptualise, anticipate and test, VtM allows for anticipating value dynamics. It starts with the assumption that value expression and definition arise in the interplay between users and technology. An extensive mediation analysis then helps to provide insight in and allows for anticipation on potential effects of technology on users and value dynamics, something that current value sensitive design approaches cannot deliver. Those insights are tested with involved actors to bring about best values by design. VtM has been applied to the case study of ViSi Mobile, a medical device developed for continuous monitoring of vital signs in hospitalised patients. A redesign was proposed that better empowers these patients.

Keywords: Values that Matter, Design for Values, Design for Value Change, Mediation Theory, Responsible Design

Introduction

How to integrate ethics in design practices? Among the various approaches that have been developed at the interface of the ethics of technology and design research, the approach of Value Sensitive Design (VSD) (Friedman, 1996) emerged as a key. The main focus of this approach is the identification of the values that are at stake in relation to concrete technological innovations, in order to take these into account in design practices and to concretise these in a material design. Values refer to what a person or people consider important in life (Friedman, Kahn & Borning, 2006). Or, as described in more detail by Van de Poel and Royakkers: "lasting convictions or matters that people feel should be strived for in general and not just for themselves to be able to lead a good life or realize a good society" (Van de Poel & Royakker, 2011, p.72).

VSD's methodology is threefold. First, the 'conceptualise' phase aims at identifying and ordering all values at stake. Consequently, 'empirical investigations' is for studying the ideas of stakeholders on values. Finally, existing technologies and their embodied values are studied as part of the 'technical investigations' followed by the design of the new product. One of the standard examples in the field – in which this methodology actually pioneered – is the development of interfaces to fine-tune the cookie settings of web browsers, integrating the value of privacy in the actual design of information technology (Friedman, Kahn & Borning, 2006).

VSD lacks a clear methodological framework despite the fact that it has been frequently used (Winkler & Spiekermann, 2018). VSD falls short especially with respect to its understanding and use of values. Namely, VSD "seems to assume that values remain stable during adoption and use" (Van de Poel, 2018). We believe, however, that values only arise in the interplay between users and technologies and are far from stable. It is therefore impossible to design for values without considering the interaction between technology, users and resulting values.

Technologies are not neutral tools. They help to shape the behaviour, experiences and even frameworks of interpretations of their users: a smartphone is not just a tool to make phone calls and exchange information, but also has important implications for people's attention and concentration, the character of friendships, the ways in which people listen to music and watch movies, et cetera (Verbeek, 2010). Users' perception, behaviour and resulting values are not stable properties, but artefacts of the technologies used. Designing for values should, therefore, anticipate the user-technology-value dynamics.

We take the 'safe cigarette' as an example. The safe cigarette was an initiative of the American National Cancer Institute in the 1970s. By embodying 'health', as a value with stable properties, in the design of a cigarette, the institute developed a cigarette with a better filter containing lower levels of nicotine with the aim to decrease nicotine intake and a better health of the smoker (Warner & Slade, 1992). Yet, after introduction to the market, the nicotine intake of cigarette users only increased (Nakazawa, Shigeta & Ozasa, 2004). As smokers were so used to their normal levels of nicotine, the safe cigarette created unconscious behaviour changes; smokers smoked more often, inhaled deeper and broke off filters to be satisfied in their daily doses of nicotine. So, instead of positively influencing the health of people, the safe cigarette negatively affected it.

This example shows that designing for values as stable properties instead of anticipating the influence of technology on user behaviour and values could end in designs 'biting back'; resulting in other and even opposite effects from the ones inscribed (Tenner, 1997). We can identify two types of value dynamics. First, there is a dynamic in value expression. The way in which technology affects a value depends on users' perception and behaviour as a result of the technology. In the example, the value of health is not improved but threatened due to users' behaviour changes. Second, there is a dynamic in value definition. The definition of a value is subject to the technologies that embody and express the value. With respect to the example, embodying 'health' in a 'safe' cigarette creates a shift from 'healthy equals non-smoking' towards 'healthy equals safe cigarettes'. This change in value definition results in undesired behaviour. A major question then concerns how one can design for values when the content of what constitutes the values is subject to the design itself?

In summarising, we believe that VSD fails to adequately design for values as it considers values as stable properties instead of products of user-technology interactions. The user-technology interactions create two types of value dynamics: dynamics in value expression and value definition. This paper aims to go beyond the Value Sensitive Design approach, on the basis of the perspective of the philosophy of human-technology relations, and more specifically, from the approach of 'technological mediation'. This approach analyses technologies as 'mediators' between users and their environment (Verbeek, 2010). From this perspective, the ambition to design values 'into' technologies needs to take into account that these technologies will always have mediating effects, by reorganising the behaviour and experiences of users, and sometimes even by affecting the value frameworks from which they can be evaluated.

We will report here an approach to 'design for values'. It takes the phenomenon of technological mediation as the starting point to anticipate the effects of design on value expression and definition. First, we introduce the approach of technological mediation. Thereafter we propose the design methodology 'Values that Matter' (VtM). This four-phased methodology; explore, conceptualise, anticipate, test, provides a responsible way to design for values and value change. To illustrate the methodology, VtM is brought into practice with a case study of a medical wearable wrist device used to continuously measure vital signs of patients in the hospital; ViSi Mobile (VM) (Sotera Wireless, CA, USA). We will study the mediating effects of ViSi Mobile and propose an alternative design that better takes into account value dynamics.

Mediation theory

The approach of technological mediation is built on the idea that technologies are not neutral. Humans shape technologies and become simultaneously shaped by them. The mediation approach originates from the

postphenomenological work of the North-American philosopher Don Ihde (Ihde, 1993). Postphenomenology studies the relations between humans and technologies and the implications technologies have for human practices and perceptions (Rosenberger & Verbeek, 2015). Rather than being 'objects' opposed to human 'subjects', technologies should be seen as 'mediators' between human subjects and the world: when technologies are used, they help to establish relations between the person using the technology and her or his environment. For example, cars do not just move people from one place to another but give them a different experience of the world than when they would walk or ride a bike. A car, for example, may provide individuals with the value of autonomy as it opens up a new world unable to be reached before. Likewise, diagnostic devices in healthcare do not only help doctors to obtain a diagnosis but also greatly affect the value of responsibility, as it takes along new ones (Verbeek, 2008).

Technological mediation typically has two dimensions (Verbeek, 2010). There is first the 'hermeneutic' dimension, related to the impact of technology on perception and interpretation. Technologies can here amplify or reduce the perception of certain elements of the world. The other dimension of technological mediation is the 'existential' one. It focuses on how technologies help to shape actions and social practices. Technologies thereby can invite for or inhibit certain behaviour. MRI imaging is a good example of both types of mediation. Hermeneutically, MRI scanners help neuroscientists to understand the brain and to develop ideas about the human mind and human behaviour in relation to the brain, which also results in new societal frameworks of interpretation, like the idea that 'we are our brains'. At the same time, existentially, these scanners reorganise the actions of doctors and the interactions between doctors and patients, while also changing social practices, like marketing ('neuromarketing') and psychiatric care ('neuropsychiatry') (De Boer, Te Molder, & Verbeek, 2018).

A special category of mediations is the mediation of moral frameworks. Interestingly, technologies cannot only be evaluated ethically but also have an impact on the ethical frameworks for evaluating the technologies. An example is the birth control pill. While being a product of the sexual revolution, it also helped to shape that same revolution. By loosening the connection between sex and reproduction, the birth control pill has shifted normative frameworks regarding sexuality: what counts as 'normal' takes on a different meaning. An interesting example of this moral mediation is the impact of the birth control pill on the acceptance of homosexuality. As Mol has shown, the disconnection between sex and reproduction also resolved an often-used argument against homosexuality: the argument that it was unnatural to have sex with somebody of the same sex, since this sexual relation cannot result in reproduction (Mol, 1997). Since the introduction of the birth control pill, the norm that sex is connected to reproduction has lost its self-evident validity.

A more recent example of this moral mediation, which has been studied empirically, is the impact of Google Glass on definitions of the value of privacy. By analysing how people discussed Google Glass online, in comments on YouTube videos of Glass users, it appeared to be possible to investigate how the value of privacy gets redefined when people apply it to a new technology (Kudina & Verbeek, 2019). Technology and morality are intricately connected. This gives an extra dimension to the ethics of technology since it implies that the ethical frameworks with which we evaluate technologies are themselves co-shaped by these technologies.

Mediation theory provides a clear framework for understanding value dynamics; the impact of user-technology interaction on value expression and value definition. Therefore, it could help a design for values methodology to anticipate in a structured way the effects that design will bring about. Only a few other authors have introduced mediation to design (Swierstra & Waelbers, 2012; Verbeek, 2013), but none have proposed a way to do this systematically. We present a design methodology based on the approach of technological mediation and aiming to anticipate technological mediations of interpretations and actions at the individual and social level, as well as the technological mediation of normative frameworks. This methodology is called Values that Matter.

Values that Matter

The design for values methodology Values that Matter aims at developing designs that embody and anticipate important values. Its name is twofold. First, it refers to the important contribution of values to life. Second, it stresses the context-dependence of values as the type of values result and depend on user-technology interactions. The methodology consists of four phases, shown in figure 1. It starts with the exploration phase in which the important actors and values become identified. Based on that, the conceptualisation phase aims to develop a concept that does justice to the identified values for the identified actors. These two phases are quite similar to the VSD methodology. It is in the anticipation phase when value dynamics comes to play a role

and where the difference starts with VSD. This phase aims, via mediation theory, to provide an anticipatory understanding of the interplay between users, technologies and values before actually implementing a technology. The testing phase allows for testing actual mediations and value conflicts as an input for conceptualisation and helps understanding how the anticipated values become appreciated subjectively in real life. Together with the previous two phases, conceptualise and anticipate, this phase allows for multiple iterations to optimally improve values by design. All four phases and their intermediate steps are illustrated in detail.
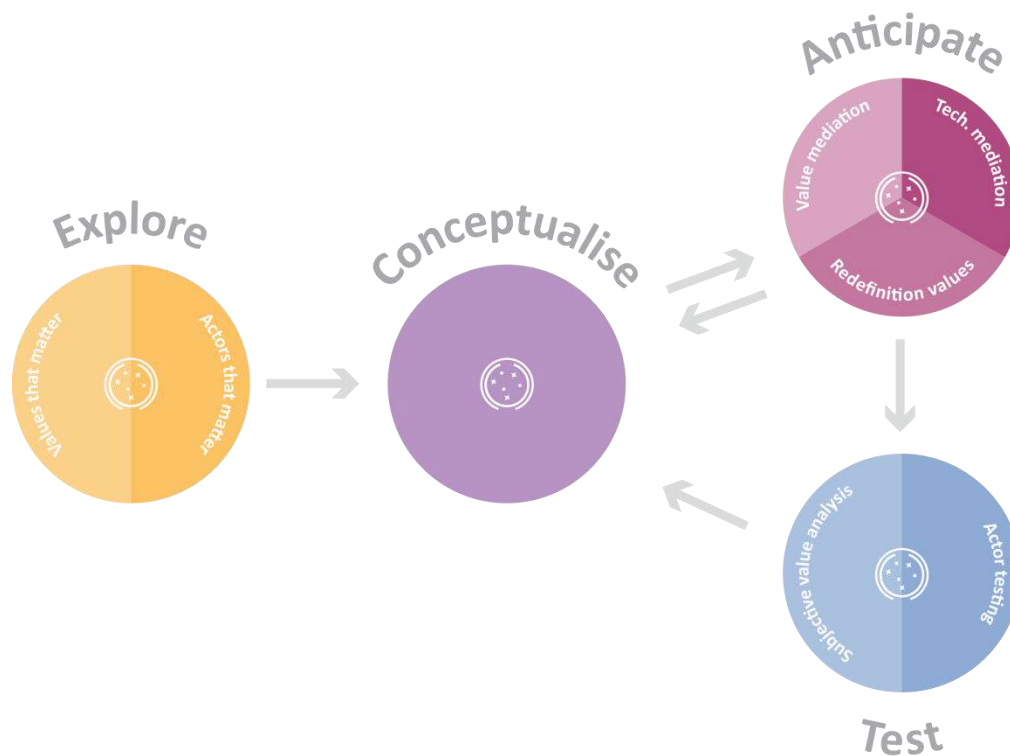
Figure 1. Framework Values that Matter

Explore

The exploration phase is for mapping out the context of the design problem. In this context, we focus on two important elements: actors and values.

Actors that matter

At first, the design team needs to identify all actors, (groups of) individuals, of importance in the design problem. Those actors need to be involved in one way or another with the design problem and will be in (in)direct interaction with the future design solution. Identification of actors could be facilitated by means of literature studies on the context of the design problem and interviews with certain actors to identify potential others.

Values that matter

Each actor has a different relationship to the design problem, resulting in different preferences, needs and values. The design team should identify per actor which values are important and to what extent. Some values might be important for all actors, whilst others could matter for just one. To understand which values matter and to define a hierarchy in values, the design team should first turn to the actors themselves by means of qualitative analyses (e.g. interviews, diaries, questionnaires...). Yet, actors reason from their current context. As values arise from the interplay between users and technologies, a new technology might change the context and introduce new values. Only the designer is able to anticipate these additional values. Brainstorming about values, literature reviews on the design problem and reviews of similar existing design solutions could help the designer to identify the additional values.

Conceptualise

The identified actors and belonging values together form the preliminary value framework. The design team starts ideation just after finishing this framework. This process of ideation should result in a concept. A concept can be anything from an abstract idea to a fully developed prototype. By means of iterations with the following phases, the concept will be developed every time with more detail up until its script solves the design problem whilst simultaneously embodying the important values for the different actors. As value conflicts could arise within a concept, the defined value hierarchy could help in decision making.

Anticipate

The anticipate phase aims via an anticipatory technology assessment at understanding the effects of the concept on value dynamics within the earlier defined value framework. Mediation theory provides the knowledge to do so. The anticipate phase consists of three steps, each described below. This phase can be executed in a multidisciplinary team including a range of actors involved in the design problem, to gain the greatest understanding of all possible ways of mediation.

Technological mediation

It is in this step that the actual mediation analysis will be executed. To systematically assess the mediating effects of the concept on all involved actors, we propose to create an actor-matrix, shown in figure 2. An actor-matrix is a matrix that lists all involved actors in both the first column and first row. This will result in a matrix with two types of crossings: a crossing between the same actor and a crossing between two different actors. All crossings of the first require an 'individual mediation' analysis. All crossings of the latter require a 'mediation of relations' analysis.

Mediation of individual: in the individual mediation analysis, the design team studies how the human-technology relationship between the actor and the concept forms the perception and actions of the actor. Mediation of perception entails the effect of the concept on the way the actor perceives himself and the way he perceives the world around him. Mediation of action entails the effect of the concept on the actions of this actor.

Mediation of relations: apart from individual perception and action, a technological concept affects the relationships between different actors. The design team should identify what kind of relationship the concept constitutes between the two actors. This should always be seen from the perspective of the actor on the left towards the actor on the right, as the relationship might be differently seen from the opposite perspective. A concept might influence how one actor perceives another actor and acts towards this other actor.

This systematic mediation analysis helps to gain a deep understanding of all the potential mediating effects of the developed concept on the different involved actors and relationships between those actors.

	Actor 1	Actor 2	Actor n...
Actor 1	Human-technology relationship *Mediation of perception and action towards the self and the world*	Human-technology-human relationship *Mediation of perception and action towards the other*	Human-technology-human relationship *Mediation of perception and action towards the other*
Actor 2	Human-technology-human relationship *Mediation of perception and action towards the other*	Human-technology relationship *Mediation of perception and action towards the self and the world*	Human-technology-human relationship *Mediation of perception and action towards the other*
Actor n...	Human-technology-human relationship *Mediation of perception and action towards the other*	Human-technology-human relationship *Mediation of perception and action towards the other*	Human-technology relationship *Mediation of perception and action towards the self and the world*

Figure 2. Actor-matrix for the Values that Matter methodology

Redefinition values that matter

A preliminary list of values that mattered per actor is developed during the exploration phase. Those values matter in the context of the design problem. When a concept becomes introduced to solve the design problem, it does not leave the list of values unaffected. The design team should, therefore, redefine their value framework. The mediation analysis is of help here. Some of the earlier defined values that were considered important might disappear, as the concept does not affect those values. New values might be added that become affected by the solution. For each value that disappears during redefinition, the design team should ask the key question: Does this matter? The answer to the question depends on the relevance of the value and the corresponding actor. When an important value has been lost, the design team should return to the conceptualise phase and reconceptualise their concept so that it will after all again embody the lost value.

Mediation of values

On the basis of the mediation analysis and the redefined list of values, the design team can now start the mediation of values analysis. They identify the effects of their concept on the different values that matter. Each identified value could get one of three labels: 'threaten', 'enhance' and 'transform' (Manders-Huits & Zimmer, 2009). A value gains the label threaten when it becomes affected negatively by the concept. A value with the label enhance will, on the contrary, become improved by the concept. Finally, the label transform is left. When a value gets this label, we deal with the mediation of moral frameworks. The concept then changes the content of what constitutes the value. Value transformations are not by default burdensome. Designers could even decide to consciously design for positive value transformations; design for value change.

After the value mediation analysis, the design team analyses their concept. How many values does it affect negatively (values labelled as 'threaten' or 'undesired transformation') and to whom do those values belong? Are there conflicting values? Are there values that cannot be given a label, as it is still unknown which type of technological mediation will be dominant? Based on the questions, the design team can either decide to return to the conceptualise phase or proceed to the test phase. Considering the first, they should redesign the source of the concept that creates the shortcomings of the design. Considering the latter, the design team can test with the actors questions brought up by the mediation analysis.

Test

In the previous phases, a concept has been developed that embodies an anticipated set of values. This phase is for testing the anticipated technological mediation. The design team should have clear questions at the start. Those could include which type of technological mediation will become dominant or how to deal with value conflicts. Moreover, it allows for studying how the anticipated set of values is actually experienced subjectively by the different actors.

Actor testing

The design team should bring their concept to the different actors and study its mediation. Via qualitative studies as, for example, interviews, observations or diaries, they can gain an idea about the real technological mediation of the concept, actors' appreciations of certain values over others or the effect of the concept on the values that matter.

Subjective value analysis

The study results of the previous step should now be analysed to answer all questions defined upfront. Answers to questions on most common type of mediation or value conflicts provide input for reconceptualisation. Answers to actors' experienced value mediation should be studied. Is the concept ready to be implemented in society or do actors experience a threat to the identified values? For each threatened value, there is an imbalance between the anticipated effect on values and the subjectively experienced effect on values. Designers should aim to find the best balance between 'what we think is good for the actor' and 'what the actor thinks is good for him'. When they conclude a value is threatened, the team should again identify the source of the concept causing the threat as input for reconceptualisation. The result of a few of those iterations between conceptualise, anticipate and test is a product that optimally improves both anticipated and subjective experienced values.

Case study: ViSi Mobile

As VtM makes the greatest difference in its anticipation phase, we will illustrate this phase by means of a case study. The case study comprises the medical device ViSi Mobile, shown in figure 3. ViSi Mobile is a wearable device that continuously measures five vital signs of hospitalised patients: arterial blood pressure, heart rate, respiration rate, oxygen saturation, and skin temperature. All data are displayed on a module on the wrist of the patient and sent to an external computer. A computer algorithm converts the vital signs into a Vital Risk Score (VRS). This score reflects the physiological state of a patient and is used as a warning for clinical deterioration. When the score is above certain predefined settings the medical staff is alarmed for extra checking on the patient (Sotera Wireless, 2018).

ViSi Mobile could create a paradigm shift in the wards of hospitals. Traditionally, nurses have to collect the vital signs of patients manually, three times a day. It takes approximately six minutes to measure, via several devices, the necessary data of a patient, write it down and insert the data in the electronic health record system. Nurses taking vitals may be less reliable and is subject to inter-observer variability. Furthermore, the large gap of eight hours between two subsequent manual measurements could result in missing data relevant for patient's care. ViSi Mobile is able to overcome these drawbacks and moreover can provide a detailed insight into the data of a patient with potential for prediction and prevention of disease course. Apart from a few minor and solvable technological problems such as a fast decay of its batteries, false-positive alarms and lost contacts between skin and sensors, ViSi Mobile has been reported a promising new device in hospital care (Weenk et al., 2017).

ViSi Mobile has been developed by the American company Sotera Wireless. In 2017, the Radboud University Medical Center in Nijmegen started a pilot study with the device to assess its potential in improving healthcare. The pilot study involved 60 patients at the internal medicine and surgery wards and showed the superiority of the device in measuring patients' vital signs in comparison to daily measurements of nurses (Weenk, Koeneman, et al., 2019).

In this setting, we studied the potential mediating effects of ViSi Mobile on their carriers: the patients. Via our Values that Matter methodology we aimed at finding mediating effects of ViSi Mobile, the potential for improvement and recommendations on actual implementation. First, we studied the mediating effects of ViSi Mobile without involving any actors. Consequently, mediating effects were discussed with patients wearing ViSi Mobile and with hospital staff. Moreover, mediating effects were derived from a first set of semi-structured interviews with 60 patients, 20 nurses, 3 physician assistances and 6 medical doctors on the positive and negative effects and perceived facilitators and barriers of the device (Weenk, Bredie, et al., 2019). We illustrate only the mediating effects of ViSi Mobile on the perception, action and values of patients that we anticipated and were simultaneously confirmed by the different actors themselves. We end with a few recommendations for the hospital on improving ViSi Mobile's design and way of implementation.

Figure 3. ViSi Mobile

Anticipate – technological mediation

Mediation of individual

Each patient is unique. Consequently, there is not one type of technological mediation. Below, we present potential mediating effects of ViSi Mobile that different types of patients can and have experienced. First, with respect to mediation towards the self, ViSi Mobile might affect patients' ideas of health. For patients, health is something intangible; invisible for the human eye, including mostly subjective feelings about one's own body. ViSi Mobile renders visible health. It quantifies health into a set of always the same objective qualities such as blood pressure, respiration rate and heart rate. ViSi Mobile is a material translation and construction of reality. Using ViSi Mobile changes patients' intentionality into a combination of original subjective feelings over own body with quantifiable data perceived on a screen.

This could have both positive and negative effects on the perceptions and actions of a patient. When patients feel similar as the device tells them they feel, patients could experience the same positive feelings as the reasons people have for using self-tracking devices at home (Gimpel & Nißen, 2013). ViSi Mobile could first provide self-entertainment: the enjoyment of data collection of own body. Second, it could contribute to self-association, in which ViSi Mobile provides the tools to understand the self in relation to others. Third, self-design might become affected. In that, patients can optimise their own bodies. It furthermore creates a ground for self-discipline: having a sense of purpose and motivation. Finally, it allows for self-healing: becoming more independent from regular healthcare, being able to leave their bed and walk around.

Yet, when the feelings of patients do not match with the data ViSi Mobile displays, which is when one feels bad or good and the data tells otherwise or when patients detect fluctuations in ViSi Mobile's data but do not understand those, ViSi Mobile mediates patients negatively. This mismatch between feelings and data could reintroduce Descartes' notorious mind-body dualism in which feelings are mind and data of ViSi Mobile body. Patients could then start to either lose trust in the data or in own feelings. In the first situation, patients could distrust ViSi Mobile and maybe even the surrounding healthcare of the hospital. In the second situation, patients could lose self-consciousness and self-confidence. They might feel anxious and suffer from feelings of alienation from themselves.

Apart from mediation towards the self, ViSi Mobile affects patients' perceptions and actions towards the world. The idea of continuous monitoring could, on the one hand, might make patients feel safe, being observed and looked after for. On the other hand, it might make patients feel exposed and objectified as a study object: unable to hide or simply opt-out.

Mediation of relations

ViSi Mobile does not only affect the patient as an individual but mediates the relationships between patients and other actors. Although many relationships between actors become affected by ViSi Mobile, we will here only consider the mediating effect of ViSi Mobile on the relationship between the patient and the nurse, seen from the perspective of the patient, summarised in the actor-matrix shown in figure 4. Due to ViSi Mobile, the patient might either see the nurse more or less often, depending on the behaviour of the nurse. ViSi Mobile provides nurses with time by replacing the time-consuming manual measurements. Nurses can now either decide to spend this gained time on socially interacting with the patient or on spending this time on other tasks. The first may lead to increased and possibly better patient-nurse contacts. This could result in an improved relationship with the nurse, feelings of trust, safety and being cared for. The latter would lead to decreased patient-nurse contacts. This might negatively affect patients' experiences. The relationship with the nurse might deteriorate, patients might feel alienated by hospital personnel, stressed for not knowing whether they are actually monitored or could experience feelings of exposure to an unknown monitoring 'eye'.

	Patient	Nurse
Patient	**Patient - ViSi Mobile relationship** *Patients might enjoy self-entertainment, self-association, self-design, self-discipline and self-healing.* *Patients might distrust VM's data or own feelings. They can lose self-consciousness and self-confidence.* *Patients might feel safe.* *Patients might feel exposed and objectified.*	**Patient - ViSi Mobile - Nurse relationship** *Patients might see nurses more often. This might result in feelings of trust and safety.* *Patients might see nurses less often. This might result in stress and feelings of alienation.*
Nurse		

Figure 4. A segment of the actor-matrix of ViSi Mobile

Anticipate – redefinition values that matter & mediation of values

Several values seem to become affected by ViSi Mobile based on the previous short mediation analysis. A selection of those values includes autonomy, bodily health, relations, bodily integrity, purpose, identity, safety and privacy. We report here the first three as these provide the opportunity for improving the design and implementation of the device.

At first glance, autonomy could be labelled 'enhanced', as ViSi Mobile seems to provide patients with the autonomy to look after their own health, understand own health and act based on that knowledge independently from the hospital staff. Yet, this label is debatable for two reasons. First, it requires that patients can interpret the displayed data and the meaning for healthier behaviour. However, from conversations with patients, we often found the opposite. Patients did not understand ViSi Mobile's data and when they did, they did not know how to act. Instead of enhancement, autonomy then may become threatened. Second, where patients gain autonomy in relation to the hospital personnel, they lose autonomy with regards to the medical device itself. Namely, ViSi Mobile takes away the autonomy to define health.

Bodily health is labelled 'transformed', as ViSi Mobile changes patient's definition of health from current and past subjective feelings into objective, current data only. ViSi Mobile excludes from the definition of health feelings and past healthcare records. This value transformation is burdensome as it might make patients feel confused, anxious and stressed, unable to relate their feelings to their bodily data.

Finally, with respect to the value relations, the relationship between patient and nurse becomes affected by the way ViSi Mobile is implemented in the care path. When the implementation of ViSi Mobile results in fewer visits of nurses, the value becomes threatened. Meanwhile, when nurses come by more often, the value will be enhanced.

Reconceptualise

Although ViSi Mobile provides benefits for the hospital, there are opportunities for improvement of the design and recommendations for implementation when the device is adopted on a larger scale. Some are discussed.

The device could benefit from a redesign with respect to the values of autonomy and bodily health. Those become negatively affected by the design of the display of ViSi Mobile on the wrist of patients. This display shows the data that can cause confusion by the patient. A redesign could target this display to improve both values. First, ViSi Mobile can help patients with the ability to be independent, converting the negative label of autonomy into a positive. Such may be done by providing patients with healthcare advice. On the basis of the physiological data of a patient, ViSi Mobile could provide this patient with tangible advice via pop-up notes on its display. For example, ViSi Mobile senses that the heart rate of a patient increases. The patient could be stressed. ViSi Mobile could advise him to find relaxation. Likewise, a patient with a low oxygen saturation could receive the advice to sit in bed and do breathing exercises. As well, when ViSi Mobile senses that a patient has not moved during the day, a pop-up note could recommend making a walk. These tangible goals allow patients to actually use ViSi Mobile's data to become autonomous by understanding how to independently improve their health.

To prevent the negative transformation of the concept of bodily health, ViSi Mobile should take into consideration the feelings of a patient and her or his healthcare records. It should include first the feelings of a patient, for example by allowing patients to report on their subjective well-being via pop-up notes. Furthermore, ViSi Mobile should provide patients with the opportunity to see their past healthcare records by, for example, entering a new screen on its display.

Finally, the double-sided mediating effect of ViSi Mobile on patient-nurse interactions shows the importance of involving nurses during the implementation of the technical device. Fostering close nurse-patient contacts would warrant for positive effects on their relations. With a few of those changes to the design and way of implementation of ViSi Mobile, the device will improve the values that matter and be able to positively reshape healthcare for both hospital staff and patients.

Discussion and conclusion

In this paper, we have developed Values that Matter, a design for values methodology inspired by the philosophy of technology. Value sensitive design approaches do, in their methodology, not greatly differ from more traditional design approaches. When we take, for example, the often used Double Diamond Model, it includes the phases discover, define, develop and deliver (Design Council, 2007) and follows thereby, just like any design methodology, a process with iterations between analysis, idea generation, prototyping, testing and implementation. The main difference between traditional design approaches and value sensitive design approaches lies in the focus on creating value for the company over creating –literally- value for the user. Yet, VtM is not like any other design approach. The main difference with other design (for values) methodologies, is the anticipatory approach and, in particular with respect to VSD, its understanding of values as a result of the interplay between users and technologies. The methodology of VtM is built around the 'anticipate' phase that makes the methodology unique. Other design methodologies could benefit from adopting such a phase to understand and anticipate design's effects in the real world.

As such an anticipatory phase requires guidance, VtM aims to provide this methodological guidance by proposing the phases 'explore', 'conceptualise' and 'test'. To optimally contribute to the 'anticipate' phase, all phases require follow-up research.

First and foremost, with respect to the exploration phase, questions still need to be answered concerning the actors and values. For example, what range of actors should become involved? Apart from actors present during the use of a design, should actors involved in the production and recycling of it be taken into consideration as well? And in case of conflicts, can certain actors become prioritised over others, and, when possible, is that ethical? Furthermore, with respect to values, is it possible to create a list of all potential values that could become embodied by design? What qualifies as a value? Are there values that matter in each situation compared to values that only matter in particular situations? And is it then possible to make a universal ranking of values, and if not, how to facilitate value ranking per context to solve conflicts in values?

Second, the conceptualisation phase needs a clear methodology. How to actually translate values into design requirements and embody values in design? Third, with respect to the anticipation phase itself, follow-up research should define this phase's ability to guide each designer through the anticipating process. Is more guidance, for example, necessary with respect to what type of mediation is studied? The case study showed it might be necessary to demarcate between the mediation of different personas within the same actor (each patient is unique) and different periods of time over the adoption of a technology. Finally, with respect to the testing phase, a more detailed understanding is essential in the balance between the 'objective' anticipated and the subjective experienced values. Actors are not always aware of what (value) is best for them and might need little anticipated help of designers. Yet, that could result in conflicts between 'what we think is good for you' and 'what you think is good for you'. When that leads to actors unwilling to use products, even though they are good for them, the products are useless. A detailed understanding is therefore necessary in how to deal with those situations.

VtM has been applied to the case study of ViSi Mobile. We have only studied the 'anticipate' phase and involved only a few actors in the process. The case study has nevertheless shown the potential of VtM to identify recommendations for design and implementation. When we would have used the traditional Value Sensitive Design approach, we would not have been able to identify the great range of value dynamics resulting from the mediation of ViSi Mobile. We would first not have been able to identify the different anticipated ways of value expression of 'autonomy' and 'relations'. Moreover, we would not have been able to

understand the change in the definition of 'health'. The used case confirms the applicability of the methodology and shows the necessity to proceed in the future with testing the entire design methodology, in greater collaboration with real design processes, companies and actors.

We have done a first attempt to provide a systematic philosophical framework for designing and anticipating value dynamics and piloted this in a relevant new technology for in hospital patient care. The preliminary results encourage the use of VtM to design more responsibly for values and even the potential to consciously design for positive value change.

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Track 3.b Introduction: Measuring and communicating the value of design

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Although design has become synonymous with innovation, a tool for good leadership and is seen as a critical factor in the success of many high performing organisations, it is still considered by many as a luxury that comes at the expense of stakeholder resources and speed to market. Many organisations must still be persuaded to employ design. Design strategy, or the politics of design, is emerging as a critical issue required to overcome the powerful forces that often inhibit the implementation of good design. Some organisations have attempted to measure design, but it is still an inconclusive practice. How do we make design impact, visible and measurable? How do designers convince decision makers of the tangible and enduring benefits of good design? How do organisations know that their designs are having the desired impact?

This track explored the theme of transforming business strategy, organisational practice and culture, influencing management decisions and impacting citizens through design evaluation. We were particularly interested in describing and providing metrics for the value of design. We were also looking to explore the ways that practitioners and academics have evaluated the success of design in organisations and society. The papers presented in this track were widely dispersed under this theme using a arrange of qualitative and quantitative research approaches.

The first of the papers presented by Menichinelli, Gerson Saltiel Schmidt and Ferronato, is a strategic view of the evaluation landscape. They map the relationships of designers, makers and social entrepreneurs using place as a frame of reference. This paper aims to define the community of designers such that the design ecosystem is visible and can be accessed.

The second paper by Münster, Kristensen, and Gabrielse is a direct look at the impact of store design and how it impacts consumer behaviour and product preferences using an experimental approach to product selection.

The third paper by Khan and Matthews, returned to the semantics of design to establish commonality on language and raises the point that there is great disparity in not only value but in how design is practiced.

The final paper by Johnson, Torrens and Storer focuses on fast moving consumer goods (FMCG) and provide a taxonomy of design considerations to make existing research knowledge more accessible for low involvement FMCG packaging designers.

The papers show significant promise in the developing field of design evaluation. However, the inability of the to demonstrate evidence of the connection of good design practice with effective outcomes remains a vulnerability of the field that practitioners will continue to face. Further work must be done to support the exploration and research into defining the value of design.

Mapping strategies for distributed, social and collaborative design systems of makers, designers and social entrepreneurs

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The practice of designers has recently evolved from a relatively closed ecosystem of professional actors to an ecosystem with less clear boundaries and roles. Makers can be considered (and often are) designers or a new kind of designers working with open, peer-to-peer, distributed and DIY approaches. And both makers and designers increasingly work with social innovation initiatives, becoming thus social entrepreneurs or collaborating with them. Where are makers, designers and social entrepreneurs, how many are there, how do we reach them and network them? This article presents a first exploration of literature, cases and datasets that represent direct or indirect approaches for mapping where they can be found. These formal or informal approaches are clustered in three groups: work, place and community. Each dimension generates a different perspective with different approaches and datasets, which influences our view and definition of makers, designers and social entrepreneurs.

Keywords: Maker Movement, Designers, Social Entrepreneurship, Distributed Design, Mapping

Introduction

The practice of designers (and the reflection upon them) has continuously evolved and the recent technological, social, and economic trends have transformed it from closed and defined processes to ad-hoc and open processes, from a relatively closed ecosystem of professional actors to an ecosystem with less clear boundaries and roles. The Maker Movement is a phenomenon that fits in this trend for at least two reasons: a) makers can be considered (and often are) designers or a new kind of designers, often working with open, peer-to-peer, distributed and DIY approaches; b) the technologies, systems and processes they adopt, build and promote are a key element further reinforcing this trend. Its preeminent characteristic of bridging the local and digital dimension and the often collaborative and social nature of its activities constitute a reason for identifying such movement as a clear example of digital social innovation (DSI) (Bria et al., 2015; Stokes, Baeck, & Baker, 2017). Moreover, this is a concept that extends the definition of social innovation (Murray, Caulier-Grice, & Mulgan, 2010): people, projects and organisations that adopt digital technologies to tackle sociotechnical and environmental challenges focusing on social or environmental impact over financial return, towards openness, collaboration, and citizen empowerment. Digital social innovation can be found in different

fields such as healthcare, education and employment to democratic participation, migration and the environment. In all of them, maker projects can be found. This represents another connection between the Maker Movement and Design, especially along the reflections about how designers (both expert and nonexpert, formally trained and informal amateurs) are developing and spreading social innovation initiatives toward sustainability (Manzini, 2015).

When creating and deploying social innovations both makers and designers can thus perform, at least partially, as social entrepreneurs, and the connection between design and social entrepreneurs have also been debated in positive terms (Brown & Wyatt, 2010; Fleischmann, 2013). Social entrepreneurs are motivated to address social problems using an entrepreneurial approach, develop and implement their innovative solutions to improve communities and the world in which we live, playing an important role in addressing social, economic and environmental challenges.
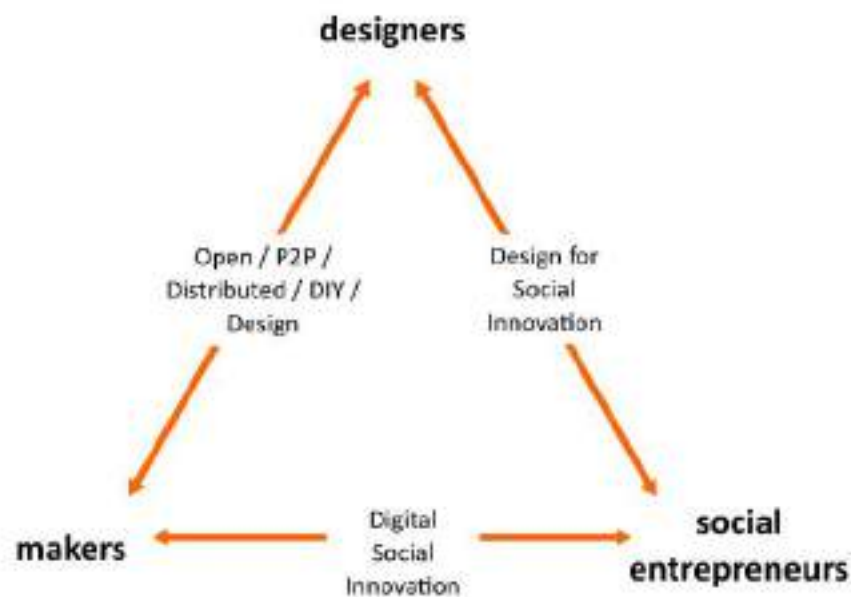
Figure 1: The distributed, social and collaborative system and its actors

While designers and social entrepreneurs have been extensively investigated and defined, the same cannot be said of makers. Both the design practice and research have already approached the Maker Movement, and one of the issues that have not been explored enough yet is the extension and distribution of this phenomena, and how much design could have a role in it. If the Maker Movement is a globally rising phenomenon, how big is it, how much is it growing and how many designers and social entrepreneurs are part of it or could join it? This is a strategic question that addresses how, where and how much the design research and practice could be influenced by and influence the Maker Movement, in the development of products, services and of social innovations. One of the main obstacles is the vagueness, complexity and uncertainty regarding the definition of makers. The meaning of being a *Maker* is broad, and it is related to *how* to clearly identify who are the makers. These characteristic are an arguable consequence of the loose and widespread nature of the definition of the term *Maker*, since its conception when Make Magazine was launched by Dale Dougherty in 2005 to promote technology, creativity, and fun (The Blueprint, 2014). Chris Anderson slightly narrows and improves its definition, considering specific practices and principles divided into three different features: a) the use of digital desktop tools for designing and prototyping artefacts; 2) the adoption of common cultural practices and collaborative processes of sharing these designs with their communities; 3) the production of artefacts with the use of digital manufacturing technologies, spaces and services (Anderson, 2012).

By exploring the size and distribution of the Maker Movement, Design and Social Entrepreneurship, this research aims

a) to understand how designers can join the movement;

b) to elaborate further research and strategies for connecting designers, social entrepreneurs and the makers;
c) to improve the definition of makers;
d) to strengthen the connection between these three actors, and therefore their work on creating and implementing social innovation.

A better understanding of this phenomenon is an exercise for both exploration and exploitation, especially if it is done with the goal of linking it to design. Moreover, it has a self-reinforcing nature: mapping helps at thinking about the identity(ies) of these actors, and the identity(ies) adopted inform our mapping. The article does not focus on the issue of the identity of makers, designers or social entrepreneurs per se, but it contributes to a small advancement in this direction if we consider that working on the identity of makers is a strategic design initiative, especially when developed with the focus of improving designers' practice and research.

Measuring and communicating the value of design is a strategic effort, and this article approaches it at the system level. Measuring the extension and distribution of the community of designers is another way of evaluating and assessing the value of design, not at the scale of single projects, but at ecosystem scale. Furthermore, understanding how designers, makers and social entrepreneurs are distributed is a further contribution towards understanding the social impact of design not just with industry but with citizens too, and the first step towards measuring it and making it visible. Innovative business initiatives often generate indirectly more jobs and economic value locally (Moretti, 2013), so the impact and importance of makers, designers and social entrepreneurs could also be higher than what expected, and this approach could be lay the foundation for further research upon the general value of design initiatives to society and economy. The main research question of this article is then: *Where are the makers, designers and social entrepreneurs, how many are there, how can we reach them and network them?* Operatively, as a first step towards answering this question, the article works with a more structured research question: *Which are the main approaches for mapping where makers, designers and social entrepreneurs can be found?* Exploring such approaches would enable us to choose the more appropriate strategies for mapping them, possibly quantifying the extension of the Maker Movement, Design and Social Entrepreneurship, and lay the foundations for the further steps of effectively mapping and networking them (and them with designers and social entrepreneurs). Therefore, it would contribute to measuring bottom-up and distributed social and collaborative systems in other contexts, adopting a triangulation of profiles for better understanding actors from different systems.

Strategies for mapping makers, designers and social entrepreneurs

This section represents a first exploration of literature, cases and datasets that represent direct or indirect approaches for mapping where makers, designers and social entrepreneurs could be found. The clusters emerged from the literature review and works on two levels: the first one can be found in the distinction between formal and informal work. On the second level, three clusters represent potential dimensions for mapping: by work, place and community. These are sometimes overlapping or connected dimensions and represent different perspectives for considering how to define the identity of makers, designers and social entrepreneurs.

Formal and informal (social and creative) work

All the mapping approaches documented in this section can be categorized as either a) based on formal definitions (and therefore formal datasets and procedures) or b) based on informal definitions or definitions of informal entities (and therefore informal datasets and procedures or indirect datasets and procedures). By definition the difference between the two categories lays in the existence of and accordance with officially recognized forms, structure or rules for the definitions or not, and in the independent and official and legal nature of the activities or not (Oxford Dictionaries, 2018a, 2018b).

Formal approaches mainly fall into official statistics and their related methodologies for measuring formal economy through employment, unemployment and underemployment. According to OECD[1], employment rates are typically defined as a measure of the extent to which available people to work are in the labour market, calculated as the ratio of the employed to the working age population. As most household domestic and personal services are not produced in the market, there are no market prices that can be used for

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[1] https://data.oecd.org/emp/employment-rate.htm

measuring them and including unpaid domestic and personal services produced for own final consumption within households would lead to considering the whole adult population as employed and therefore with no unemployment at all. Unemployment is defined in the labour force framework as an extreme l lack of work, and situations of partial lack of work are normally considered as partly employment, or underemployment. Within formal statistics, population is usually divided into three mutually exclusive and exhaustive categories: employed, unemployed, and people not in the labour force (or not currently active); the first two categories compass the active population.

Formal approaches for identifying makers, designers, and social entrepreneurs could be then based on official statics or on their related methodologies, that explicitly do not consider activities outside the market, for which informal approaches might be more suitable. Conceptually, the "informal economy" is defined as "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements" (ILO, 2002). More than 60% of the world's employed population earn their livelihoods in the informal economy and it represents more than 90% of Micro and Small Enterprises worldwide. More than 60% of the world's employed population earn their livelihoods in the informal economy and it represents more than 90% of Micro and Small Enterprises worldwide. According to WIEGO (Vanek, Chen, Carré, Heintz, & Hussmanns, 2014), the components used to measure informal employment inside the informal sector is comprised of all employment in informal enterprises, including employers, employees, own account workers, contributing family workers and members of cooperatives. A review of indirect methods includes (Williams & Schneider, 2016):

- the discrepancy between national expenditure and income statistics;
- the discrepancy between national the official and actual labour force;
- the transactions approach refers to a constant relation over time between the volume of transactions and official GNP (Feige, 1989);
- the currency demand approach considers who considered the correlation between currency and tax pressure (Cagan, 1958): this approach assumes that shadow (or hidden) transaction are undertaken in the form of cash payments, so as to leave no observable traces for the authorities (Tanzi, 1999);
- the physical input (electricity consumption method).

The key argument for direct methods is because they provide deeper understanding regarding the structure of the shadow economy, in opposition to indirect methods crude assumptions and that are far for being proven (Thomas, 1992; Williams & Windebank, 1998). In short therefore, as an exploratory analysis of what makes a good measure to identify makers, designers, and social entrepreneurs in the informal economy, the combination of these two main approaches can be suggested:

- A residual approach identifies a part of the population in relation to the total, an objective measurement.
- A multidimensional approach ("multilateral" or "direct methods") is a distributionally-sensitive metric (Alkire et al., 2015) related to normative choices, in terms of dimensions, indicators, weighting, the unit of measurements, and aggregation.

Figure 2: Formal and informal definitions and approaches

Considering the work dimension as a mapping strategy

The work dimension of makers

This dimension is where the new, emerging and under constant changing nature of the Maker Movement is connected to both informal practices and expectations, and forecasting of future working conditions (both formal or informal). If makers were considered as typical manufacturing professionals (just like craftsmen or manufacturing employees) formal jobs could be then easily found with official statistics and mapped accordingly, but the definition adopted here points to more informal profiles. For this reason, the main contributions about the work dimension of makers that were found in the literature review adopted in-depth interviews, focus groups and surveys as the main approach, and therefore are limited in scale and cannot be considered as representative of the whole movement. Joint Research Centre (JRC) provides insights into the expectations of the Maker Movement towards the future of work using eight thematic narratives: Automation, Globalisation, Micro-Factories, Sharing Economy, New Skills, Green Economy, Ageing, and Migration (Valente De Jesus Rosa, Martinho Guimaraes Pires Pereira, & Ferretti, 2018).

The *Makers' Inquiry* investigated the socio-technical and professional dimensions of makers in Italy, with a survey of 134 participants (Bianchini, Menichinelli, Maffei, Bombardi, & Carosi, 2015; Menichinelli, Bianchini, Carosi, & Maffei, 2017). Even with the limits in terms of participants and geographical focus, the research provided insights about at least three interesting issues related to this article. Firstly, it investigated three different profiles of makers: a) makers as technologically advanced people who tend to use digital technologies for communicating, manufacturing and sharing their projects (Anderson, 2012); b) (Indie) Designers: Individual design actors that own or manage all the competencies related to design, production, and distribution processes, thus becoming self-producers (Bianchini & Maffei, 2012); c) managers of Maker Laboratories. Secondly, it showed that regarding the formal working conditions (eg, work contracts) of makers, 38.7% of subjects that are self-employed individuals (with or without VAT), 17.1% have open-ended contracts and 5.2% fixed-term contracts, showing that making is mainly an independent and autonomous activity, a new way of working professionally and not just a hobby, even if a secondary or supplementary activity. Thirdly, there is an interesting overlap between the territorial concentrations of Italian makers within historical industrial districts and urban contexts, contributing an interesting insight: makers could be found within cities, creative and industrial districts.

The work dimension of designers

Given the historical connections of design with industry, traditionally formal work positions are arguably the most proper dimension for quantifying the number of designers. A report published in 2006 by BEDA (the Bureau of European Design Associations) aggregates statistics at national level from European countries and found, overall, a total of 410,000 designers in Europe that generated an annual turnover of 35 billion euros (Design Austria & BEDA, 2006). The report is made from aggregated data from different sources, so it is unevenly structured, and the focus is not only on the number of designers but also to their contribution to national economies. The importance of the contribution of design to business and industry is documented also in the *€ Design | Measuring design value*[2] project that aimed at providing tools for policy makers and decision makers to measure the positive impact of design to the economy. Another recent and relevant example in this direction is the *Design Economy 2018* report published by the Design Council about the state of design in the UK, which found +1,067,600 designers; the report is also relevant for its calculation of the economic impact of design, for the identification of local clusters and for the clear documentation of the methodologies adopted which could be then replicated in other countries (Benton, Miller, & Reid, 2018). At European level, Eurostat collects data about cultural employment by including all persons working in an economic sector defined as cultural, including all occupations relating to culture, finding around 8.4 million people in cultural employment across the EU (3.7 % of total employment)[3].

Data regarding professional designers could be extracted also from other non-official sources, like the Linkedin platform - through the overview page of designers[4], its search results (showing 7,280,175 designers at the time of writing)[5] or with more advanced techniques (Dai, Nespereira, Vilas, & Redondo, 2015). Similarly to the

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[2] http://www.measuringdesignvalue.eu/
[3] https://ec.europa.eu/eurostat/statistics-explained/index.php/Culture_statistics_-_cultural_employment
[4] https://www.linkedin.com/title/designer
[5] https://www.linkedin.com/search/results/people/?keywords=%22Designer%22

Makers' Inquiry (and an inspiration to it), the Designers' Inquiry (Cantiere per pratiche non-affermative, 2013) also describes the profiles of Italian designers with a survey. Regarding the work dimension, the majority of them (41.3%) is a freelancer while less than a quarter (22%) is an employee and even less is a studio owner (10.6%); 57.8% of them does not have a contract, 36,4% has a second occupation of which 54,8% is still in the area of design. It is important to note that 48% of the Italian freelance designer does not have VAT, depicting thus the work of many Italian designers as closer to the informal economy.

It is important to mention that designers have often interacted with what is commonly regarded as informal economy (Kaya & Yagız, 2011) in poorer countries, but the presence of informal jobs is clear even in countries with an established design industry like Italy, and not just for designers but also for manufacturers of designers' products in the fashion industry (Paton & Lazazzera, 2018). Home work here is probably caused by the lack of a national minimum wage, the fragmented structure of the sector, the common practice of outsourcing. National statistics estimates that in 2017 there were 3,647 home workers in the manufacturing sector, operating with regular contracts, but other researchers calculate that there are 2,000 to 4,000 irregular ones (Toffanin, 2016). The informal dimension of design is becoming increasingly important with the current trends of design democratisation and the rise of social media (Gerritzen & Lovink, 2010), alongside with the growing ties between design, social innovation, citizen participation (Manzini, 2015). Moreover, the emerging possibilities at the intersections of design with open source, peer-to-peer, decentralised, distributed and diffuse design projects (Abel, Evers, Klaassen, & Troxler, 2011; Menichinelli, 2016a) also enhance the informality of design practice.

The work dimension of social entrepreneurs

In order to identify measurements for mapping professional social entrepreneurs, the Global Entrepreneurship Monitor (GEM) constructed a dataset on social entrepreneurial activities in 49 countries (Lepoutre, Justo, Terjesen, & Bosma, 2013). In an attempt to overcome country-specific definitions and differences in legal status, the researchers used telephone or face-to-face household surveys in the national languages that indirectly (to exclude country-specific legal or bureaucratic definitions of social entrepreneurship) identified social enterprises through questions on the predominance of a social mission with the creation of social value, the importance of innovation by delivering innovative products and services, and the role of earned income. The survey data was then weighted based on age and gender (and education and ethnicity whenever appropriate) to reflect the national population and harmonized with the other countries. The national context plays in fact an important role in shaping the characteristics of social enterprises in terms of sectoral specialisation, funding and employment: among the countries, higher rates of traditional and social entrepreneurial activities are correlated.

Mapping the third sector is a measurement for identifying where social innovations and social entrepreneurs are: for instance, by locating NGOs and Foundations registered in public institutions (Anheier, Krlev, & Mildenberger, 2019). Another possibility can be found in mapping B Corporations, business initiatives that balance profit with social and environmental performance and accountability (Cao, Gehman, & Grimes, 2017; Hickman, Byrd, & Hickman, 2014). Moreover, seeking funding for the idea of the social enterprise might require buy-in from public sector or third-sector agencies whose governance is in the public domain. Therefore, identifying where funding opportunities for social entrepreneurs comes from could be another indirect way of mapping the location of social entrepreneurs.

Considering the place dimension as a mapping strategy

The place dimension of makers

Makers often gather and meet in a series of local laboratories but that are often networked regionally and globally: Fab Labs, Makerspaces, Hackerspaces and so on. These laboratories act as schools, community hubs and professional centres where the Maker Movement has been emerging and building social and collaborative initiatives. The number of these laboratories is always changing, making it difficult to completely track them. However, because they are bottom-up initiatives, several platforms have been established through the years to map them, such as Fablabs.io[6], Hackerspaces.org[7], or the recent list[8] of makerspaces elaborated by MAKE

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[6] https://www.fablabs.io/

[7] https://wiki.hackerspaces.org/

[8] https://makerspaces.make.co/

magazine. Such numbers could be a) considered as a proxy of the number of local makers, maybe assigning average quantities or b) each laboratory could be directly contacted to receive a more accurate estimate.

A JRC report was elaborated recently using several sources of data, including some of these platforms, reporting that Fab Labs account nearly for half of the makerspaces in the European Union (48%; 397 laboratories), Hackerspaces are 40% (327 laboratories) and then there are other type of laboratories for 12% (102). The average number of makerspaces per country is 29.5. France, Germany and Italy represent 53% of the makerspaces within the European Union (Rosa, Ferretti, Pereira, Panella, & Wanner, 2017).

The place dimension of designers

In a similar way, the number of designers and their distribution could be either estimated or asked directly to design schools and design businesses. The 2006 BEDA report (Design Austria & BEDA, 2006) provides some numbers regarding schools and design businesses, but it is unevenly structured, so more organized and complete databases should be found or created for this task.

A global list of art and design universities is maintained by the Cumulus International Association of Universities[9], which lists 286 members from 57 countries in 2018[10]. The DESIS Network is a network of more than 40 Design Labs based in design schools and in other design-oriented universities and operating with local, regional and global partners that connects designers and social entrepreneurs and aims at using design knowledge to co-create social innovation initiatives (Cipolla, 2018). The different clusters (food, ageing & ingenuity, distributed and open production, city-making, public & collaborative, etc) help to map how design for social innovation and sustainability is being built in theory and practice. The Service Design Landscape[11] is a research project developed by Politecnico di Milano and addressed to the forthcoming students of service design: a crowdsourced online map, lists 192 higher education programmes, 420 consultancies, 53 research centres.

The place dimension of social entrepreneurs

Depending on the business life cycle or specific needs, social entrepreneurs can rely on different physical spaces for developing their ideas and initiatives, which can then work as entry point for mapping the geographical distribution of social entrepreneurs. Coworking, incubators and accelerators are typical examples of place dimension for social entrepreneurs. Several coworking act as spaces for social entrepreneurship, where ideas are advanced through collaboration. Impact Hub[12] is the largest network focused on building entrepreneurial communities for impact at scale; it reports more than 100 locations in more than 50 countries, for a total of more than 16,000 members. The Centre for Social Innovation[13] is a coworking space, community, and launchpad for people who intend to change the world, and it operates nearly 100,000 square feet of space and supports more than 1,500 members by providing the spaces and tools they need to succeed more quickly and to have a far greater impact.

Considering the community dimension as a mapping strategy

The community dimension of makers

The social and collaborative nature of the Maker Movement has the consequence that the community dimension is relevant and present in different ways, at least on three levels: 1) a global community of local events and laboratories: the global Maker Movement, Fab Lab network, and so on; 2) local communities that form in and around local laboratories; 3) the communities that form around the development of projects, especially the ones that are shared and developed openly as Open Source Software, Hardware or Open Design, which then become community-based initiatives.

On the first level, a global community can be analysed and quantified through the analysis of social media platforms like Twitter (Menichinelli, 2016b); or through the analysis of specific platforms of the Maker Movement like Thingiverse, the most popular platform for sharing and downloading 3d printable models (Özkil, 2017; Voigt, 2018). Such analysis typically involves not only the quantification of users, labs and

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[9] https://www.cumulusassociation.org/homepage/what-is-cumulus/
[10] https://www.cumulusassociation.org/homepage/members/
[11] https://www.servicedesignmap.polimi.it/
[12] https://impacthub.net/
[13] https://socialinnovation.org/

projects, but also of their connections and interactions through a social network analysis approach, resulting thus also an exploration of the social dynamics and structure emerging from makers and building the context for their work and further interactions and dynamics. Furthermore, such analyses are also able to quantify the output of such communities: the number of designs, innovations, collaboration and so on, providing thus a step towards understanding also their value generation and impact.

On the second level, local communities that form in and around local laboratories such as Fab Labs have been analysed especially through ethnography: a more qualitative approach, but also able to shed light about the dimensions of a local community and potentially also of its evolution over time (Ghalim, 2013; Maldini, 2014).

On the third level, the communities that form around the development of open source projects are often analysed in terms of their social structure, providing an overview of the outcomes generated by social networks of interaction (Bonvoisin, Buchert, Preidel, & Stark, 2018; Menichinelli, 2017). The participation in open and collaborative projects provide data and methods for assessing the geographical location of the participants: inferring locations from the top-level domains of participants' email addresses; self-reported locations or time zones of developers on platforms like GitHub; self-reported time zones (Gonzalez-Barahona, Robles, & Izquierdo-Cortazar, 2016; Takhteyev & Hilts, 2010). These approaches have enabled researchers to investigate geographic and organizational of projects (Bird & Nagappan, 2012), the impact of location over acceptance of individuals' contributions (Rastogi, Nagappan, Gousios, & van der Hoek, 2018) and the effect of geographic distance on social relationships (Heller, Marschner, Rosenfeld, & Heer, 2011).

This social dimension can be also considered as the context for research that aims to uncover the phenomena of lead users or user innovators (be them firms or individual consumers): consumers who develop or modify consumer products (von Hippel, 1988, 2005). These can be considered also as relevant for the Maker Movement, especially for their tendency to develop and share innovations freely, without intellectual property rights and with grassroots innovation processes (von Hippel, 2016). Research initiatives along this direction were able to estimate, with phone surveys and a database of consumers, the number of consumer-innovators aged 18 and over in UK (2.9 million), USA (11.7 million) and Japan (3.9 million) and their expenditures, which is sometimes larger than the expenditures of traditional firms (von Hippel, Ogawa, & PJ de Jong, 2011). It is also important to note that the work of lead users and consumer innovators is not only related to products and technology, but it extends from them to social innovation when coupled with Technological Reflectiveness (TR) (Schweitzer, Rau, Gassmann, & van den Hende, 2015), with the commercialisation of products and services for social purposes with social enterprises (Koers-Stuiver & Groen, 2015), with their connection with participatory design (Morjaria, Ross, & May, 2013) and service design for sustainability initiatives, like the research that originated the DESIS network (Meroni, 2007).

Research on lead users and consumer innovators has developed several rigorous approaches for mapping, identifying and reaching them. The first and most common approach is through mass screening of entire populations (a parallel search strategy) with written, phone and online surveys; the inefficiency of this approach and its requirement of a specific and established population have pushed for the introduction of new methods. One of them is broadcasting, where experts self-select according to their expertise after an initial communication of the problem, in a process similar to crowdsourcing (Jeppesen & Lakhani, 2010). More advanced methods work on the social dimension of lead users: one of the main methods is pyramiding (a sequential search strategy, where improvements can be done between iterations), a variant of snowball sampling, a process based upon the exploration of social structures where participants, thanks to their expertise, identify other participants to be contacted (von Hippel, Franke, & Prügl, 2009). Lead users have also been studied in terms of their position in social networks and commonly found in-between different social groups (Kratzer, Lettl, Franke, & Gloor, 2016). More recently, these approaches have been extended to online communities and digital methods, thanks to their flexibility and to the vast amount of accessible data, for example with netnography approaches (Belz & Baumbach, 2010), with focus on a single social media platform like Twitter (Pajo, Verhaegen, Vandevenne, & Duflou, 2015) or multiple social media platforms (Tuarob & Tucker, 2015). A further evolution of this direction can be found in digital anthropology, which allows a better accountability of the data through triangulation of different sources (Sánchez, Giacalone, & Goduscheit, n.d.).

The community dimension of designers

Considering designers mainly as professionals, within the scope of this article, their community dimension mainly consists of a) association professionals or online or b) global or online communities.

There are several associations of design professionals, mainly working at national or regional level, that promote their members and their interests and therefore typically maintains a list of their members and sometimes of their projects: each could be contacted, the gathered data organised in a coherent way for all of them. Examples can be found in the Italian association ADI (Associazione per il Disegno Industriale, founded in 1956), which claims to have more than 1,000 members[14] and maintains also a database of their projects, registered as an IP protection strategy. AIGA (American Institute of Graphic Arts, founded in 1914), a US-based professional association for design, comprises of more than 70 chapters and more than 25,000 members, that are listed in the Designer Directory[15], a database that allows search for AIGA members by name, location and/or area of practice. Furthermore, AIGA suggests searching for designers by browsing their AIGA Member Portfolios, posting a job or internship on the AIGA Design Jobs board or by contacting an AIGA local chapter. IDSA (Industrial Designers Society of America, founded in 1965) is an association dedicated to industrial design and consists of a network of Professional Chapters and Student Chapters in the United States, organised into five Districts based on geographical region[16].

More recently, global associations have emerged thanks to digital platforms and thanks to the now global extension of the design discipline, especially regarding more recent fields: IxDA (Interaction Design Association, founded in 2003), is a global network of more than 100,000 individuals and over 200 local groups dedicated to the discipline of interaction design[17]. SDN (Service Design Network, founded in 2004), is an online platform dedicated to connecting service designers, with 42 local chapters and 1,381 registered users[18]. Continuing this trend, from national official associations to global online organisations, now digital platforms are increasingly emerging for the promotion of designers with the sharing and discussion of projects like Behance (Halstead, Serrano, & Proctor, 2015; Kim, 2017). Such platforms might be easier to for accessing data and analysing it but represents a different way of community-building: fewer official organisations, less interest in collective political discussion, promotion and lobbying and more on individual or professional promotion.

The community dimension of social entrepreneurs

A range of social innovation organisations has emerged to network social entrepreneurs. Ashoka cultivates a community of change leaders that collaborate to transform institutions and cultures around the world, so that everyone can be agents of positive social transformation. Ashoka has elected more than 3,500 fellows from 92 countries, and the community of its fellows has been analysed (Meyskens, Robb–Post, Stamp, Carsrud, & Reynolds, 2010). Social Good Brasil[19] exists to enhance human skills and exponential technologies so that more people and organizations act to solve society's problems. It is made up of organizations and individuals who are protagonists in creating, collaborating and sharing innovations. here are 59 fellows, and 130 local and international mentors. SIC (Social Innovation Community)[20] is a Horizon 2020 Programme funded project that aimed at exploring relevant topics for researchers and setting out a roadmap for the future of social innovation research. Over 350 representatives from over 19 EU countries have played a role in co-producing a vision and 10 policy ideas related to the theme. The DSI Digital Social Innovation initiative[21] has been developed by several European organisations and currently has 1,440 projects and 2,230 organisations related to fields such as education, healthcare, democracy, environment, and employment.

Conclusions

This article presents a first exploration of literature review, datasets, different cases (digital platforms, organisations, research projects) that shows how the social and distributed design systems of makers, designers and social entrepreneurs could be mapped. These contributions work with formal and informal definitions, procedures, sources, and with direct and indirect focus at different granularity levels: country, region, city, organisation, and project. Adopting these approaches would bring closer the formal and informal

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[14] http://www.adi-design.org/associazione.html

[15] https://www.aiga.org/designer-directory

[16] http://www.idsa.org/communities/districts

[17]17 https://ixda.org/community/local-groups/

[18] https://www.service-design-network.org/community

[19] https://socialgoodbrasil.org.br/

[20] https://www.siceurope.eu/

[21] https://digitalsocial.eu/

nature of such actors, since makers are still informal actors, designers are increasingly becoming informal through freelancing, and the use of digital platforms is becoming an unofficial community space and source of data. Therefore, it is not a surprise that contributions regarding Lead Users are probably the ones with more experience and richness: they bridge the gap between amateur and professional, between bottom-up and top-down. After a first manual clustering of the contributions, several common approaches can be identified, be them existing formal or informal sources, or research methods to be applied (figure 3):

- data from traditional official organisations (public, associations, networks, businesses);
- surveys, interviews, ethnography;
- data mining of social media services and digital platforms;
- places related to actors' education, work, and their community hubs;
- methods based on the social structure of these systems (pyramiding, social network analysis).

This article is the starting point for a simple framework for future research on social and distributed design systems, and both the three profiles (makers, designers, social entrepreneurs) and the three dimensions (work, place, community) should be further investigated in depth. This exploratory analysis should be transformed into a more in-depth analysis; approaches and literature should be expanded, datasets checked, organisations contacted, their data evaluated in order to compile a more rigorous list of compatible approaches and how they could be integrated. Missing or not easily accessible datasets should be investigated and published openly; data should be made coherent among countries and at global level, and geographical differences between developed, developing, emergent countries should be weighted, analysed and highlighted. Future research should address these limitations and provide more coherent approaches and datasets: it should investigate how much these approaches influence the definition of the actors, their understanding and promotion. The social, economic and political dimensions of these approaches and therefore of the representations of the actors and of their social diversity should be considered: gender, ethnicity, language, race, religion, sexual orientation, cultural beliefs, age, class and the intersectionality linked to these social identities. These datasets and approaches are contributing towards a further definition of designers, makers and social entrepreneurs: such definitions are now temporary, and future research should address this topic more, with both data-driven and design-driven approaches, for example by clustering data with machine learning algorithms or with a research through design approach (Redström, 2017).

Figure 3: The main contributions for mapping the actors of distributed, social and collaborative systems

One of the consequent next steps would be to define a set of approaches and adopt them for creating a global dataset of the distribution of these actors at country and regional level, besides the creation of a simple multi-composite index that would then convert several measurement into a simple 0-10 scale for easy visualization and communication (OECD & JRC, 2008). Such index, a SDD Index (Social and Distributed Design Index) could then be used for comparison with other indexes, for example of well-being indexes (OECD, 2011, 2014) or the Digital Social Innovation (DSI) Index (Bone, Codrina, & Stokes, 2018). Moreover, the knowledge and insights that can be generated from such dataset or index could be the starting point for further studies, for example the measurement of generated financial value, employment and social and environmental impact, for example by connecting it with the metrics of the Sustainable Development Goals (SDGs).

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Do Beautiful Stores improve Product Evaluation?

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Retail designers often emphasize the importance of creating stores that consumers will find attractive. This paper challenges that commonly held view, presenting empirical results from a field experiment showing that a positive rating of a store interior does not affect the product rating to the degree expected. This paper proposes a method for measuring spillover effects, which ordinarily take place without conscious attention. The method was applied in an experiment where 50 shoppers were asked to rate six fashion products in three differently designed stores. Respondents were asked to rate stores and products from within the stores. Any discrepancy between the in-store ratings can be interpreted as the influence of the store design. Results indicate measurable spillover effects from store design to product preference. Surprisingly, however, only one of the three stores showed a significant correlation between the respondents' highest product rating and store preference.

Keywords: Retail design, store design, retail atmosphere, field experiment, consumer preference

Introduction

Throughout mankind's history, architectural spaces intended to enhance a particular experience account for significant expenditures of both effort and resources (Gehl 2011; Lawson 2001). It is also widely acknowledged that physical surroundings have an effect on not only our feelings and behavior, but also on our experience of other objects or entities in that environment, be they works of art, music, or artifacts (Clark 2006; Damasio 1995; Frijda 1989). Retailers are well aware that store environments have an influence on consumer behavior and emotion, and as a component of a marketing strategy often devote considerable resources to designing stores that display their products. Stores can be designed in countless ways, so what should the retail designer's priorities be, if the goal is to create store environments that attract consumers and sell products?

Philip Kotler (1973) was among the first researchers to acknowledge the effect of store design. He introduced the term 'atmospherics' to denote the intentional control and structuring of environmental cues. Since that time, scholars have undertaken various studies on atmospheric variables in retail spaces (J. A. Bellizzi, Crowley, and Hasty 1983; Donovan et al. 1994; A. M. Kent and Kirby 2009; Spence et al. 2014; Turley and Chebat 2002; Turley and Milliman 2000). In spite of these efforts, we know surprisingly little about how consumers are actually affected by a store design as a whole. Consumers are seldom asked to provide feedback about their experiences of store designs. Even when they are, this feedback is of questionable reliability, since most people are simply not able to articulate how an interior environment affects them, let alone their perception of products within that environment. At least some portion of atmospheric effects take place without conscious attention, and this circumstance casts a shadow over direct interrogation as a method of data collection. Previous research has addressed how context can affect product perception and refers to

this phenomenon as a 'spillover' effect (Hagtvedt & Patrick 2008; Leder et al. 2004) yet scholarship investigating the spillover effect from store design to product perception is meager at best.

This paper describes first of all a study design for measuring the extent to which store preference spills over onto product preference, and then compares this measurement with respondents' explicit impression of the store design. The method is tested in a field experiment conducted in three fashion stores with contrasting interior designs. In the experiment, the store design preferences of 50 shoppers are correlated with their product preferences within the three stores. Data from the experiment shows that a spillover effect from store design onto product preference is in fact measurable. At the aggregate level, product preferences are indeed supported by highly rated interiors. But analysis of ratings taken from within each of the three interiors separately reveals interesting differences. By virtue of repeated individual measurements carried out in the three different settings, we can see that the supporting effect of a highly rated store interior is present in only one of three test stores. No significant connection between store preference and product preference is identifiable in the two remaining environments. These results and their implications lay the groundwork for a theoretical discussion about spillover effects from within the context of retail design.

The following provides a brief introduction to existing studies on retail atmospherics and the perception of designed environments. We discuss literature supporting the contention that interior spaces affect product perception, and also describing the fact that environments are largely experienced unconsciously and how this complicates studying their effects. Following this we describe our methodological approach, document the field experiment, and then present and compare the results. Finally, the paper ends with a discussion of the theoretical, methodological, and managerial implications of these findings, and proposes areas for further research.

Background

Studying Store Atmospheres

A number of scholars have studied the effects of individual atmospheric cues in store design. The literature is replete with studies investigating atmospheric variables such as sound (Knoferle et al. 2012; Milliman 1982; Morin, Dubé, & Chebat 2007; North, Sheridan, & Areni 2016; Yalch & Spangenberg 2000), color (J. A. Bellizzi, Crowley, & Hasty 1983; J. a. Bellizzi & Hite 1992), odor/scent (Chebat et al. 2012; Herrmann et al. 2013; Spangenberg, Grohmann, and Sprott 2005), lighting (Areni and Kim 1994; Custers et al. 2010; Quartier, Vanrie, and Van Cleempoel 2014), and indoor climate (Frontczak & Wargocki 2011; Zhao, Kim, and Srebric 2015). But atmospheric cues are never experienced in isolation. Recently, scholars have begun to suggest that studies taking a more holistic approach to retail environments should provide a more realistic assessment of their effects on consumers (Baker et al. 2002; Ballantine, Parsons, & Comeskey 2015; A. M. Kent & Kirby 2009; van Rompay et al. 2012; Spence et al. 2014).

Several circumstances stand in the way of studying variables in store environments with any precision. First of all, as mentioned above, consumers do not experience individual cues in isolation, but rather experience the store environment as a whole (Ballantine, Jack, and Parsons 2010; Ballantine, Parsons, and Comeskey 2015; Mattila & Wirtz 2001). Moreover, store atmospheres are created as backgrounds for merchandise, and the influence of the atmosphere is largely experienced without conscious attention. Consumers do not enter a store to evaluate its interior, or to consciously identify qualities that attract their attention (Newman and Foxall 2003). The effect of the retail interior can therefore be difficult to verbalize and recall (Donovan & Rossiter 1982). Consumers come to stores to shop, and their attention is normally focused on the products, and not on the interior design. For these reasons, the use of direct interrogation as a method for studying retail atmospheres is problematic at best. To counteract the effects of quickly fading memory, measurements in any such study should be taken as closely as possible to the time and place of the shopping experience, and preferably from within the store itself, so that the influence of the environment is still in effect (Donovan & Rossiter 1982). Control of multiple variables also presents a challenge for researchers. Some studies approaching atmospheric cues holistically do exist, but most are made in artificial settings where variables are easier to control. Research shows, however, that people behave and react differently in an artificial setting than they do in a 'real life' setting (Frijda 1989; Groeppel-Klein 2005; Lynch, Jr. 1982; Tversky 2008). A subject's simple awareness of being in a laboratory or other artificial setting shifts his or her consciousness, and therewith any response he or she might give. In reality, a consumer's experience of a store

consists of a blending of sensory effects, a commingling that is difficult if not impossible to achieve in artificial settings. This seems a strong argument for studying customer experiences in real shops, despite the problems presented by their complexity.

A small group of scholars have indeed braved these challenges and executed holistic studies of store atmospheres in real shopping environments. Ballantine et al. (2015) made on-site interviews to analyze atmospheric cues in store environments, while both Kirby and Kent (2010) and Petermans, Kent, and Van Cleempoel (2014) used photo-elicitation, where respondents are shown photographs of a store environment, to better understand how atmospheric cues are interpreted by consumers. This method provides a visual representation of the environment as a whole, and therefore to some extent represents the actual store atmosphere. Studies like these provide a good beginning to the study of consumers' store experiences from a more integrated perspective. Still, a significant problem is common to the method of these studies, and one that potentially clouds their results. This problem is that direct interrogation necessarily triggers respondents' reflection upon their own reactions, which colors the nature of their responses. In addition, interrogation presupposes respondents' ability to express how a store design affects them, when in fact this ability varies considerably among individuals. Actual experiences of interior spaces are immediate and take place without much conscious reflection. We therefore believe that we should not limit our investigations to respondents' conscious expression, but incorporate unconscious effects, which the respondent might not be able to articulate. We will expand upon these ideas, and how we approach this conundrum, in the following sections.

Beauty and Judgment of Store Designs

Most people will be able to recall the sensation of entering an architectural space that incites a bodily reaction, or perhaps even feelings, like happiness, excitement or fear. Most people can also recall a particular store where the atmosphere created a particular feeling, without being aware of what it might be that gave rise to that feeling. It is well known that variables like figural goodness, contrast, repetition, symmetry, and prototypicality influence aesthetic judgments (Kubovy 2000; Leder et al. 2004; Martindale & Moore 1988). It is also well known that aesthetic judgments are individual and depend on a person's memory, knowledge, experience and personal taste (Leder et al. 2004; Reber, Schwarz, & Winkielman 2004). Thus, the impact of a store design is highly context-dependent, and inevitably associated with a consumer's personal experiences of the individual store (van Rompay et al. 2012).

In order to investigate whether a consumer's appreciation for a store design affects their perception of the products in it, we need to be clear about what we mean. In the title of the paper we use the word 'beautiful,' which can mean many things. Studies of beauty are rare, perhaps because the concept is so difficult to define precisely, changing as it does according to time and place. A preponderance of the beauty studies that have been carried out are associated with Gestalt theorists such as Rudolf Arnheim (1974) and Ramachandran and Hirstein (1999). Aesthetic experiences are often supposed to be experienced intuitively. Asking people to articulate such experiences will usually receive a reply reflecting a rationalized version of what is assumed to be 'good taste.' For this reason, researchers rarely ask respondents to comment on 'beauty' or 'good taste' per se. Instead, most researchers focus on attributes like figural goodness, pleasantness, liking, or preference. The argument is that eliciting such simple judgments makes it is possible to identify the basic processes or modifying variables that underpin aesthetic experiences (Reber, Schwarz, & Winkielman 2004). Judgments based on the question 'how much do you like this interior?' are therefore believed to be closely related to how beautiful or aesthetically pleasing an interior is in the eyes of the respondent. For our purposes, we will define beauty in the following way: a subjective experience of pleasure produced by products/interiors and not mediated by intervening reasoning. This formulation hews closely to definitions of aesthetic experience used by Kubovy (2000); Martindale and Moore (1988); Reber et al. (2004) and Leder et al. (2004). This study is therefore designed around the question 'how much do you like this store/product?' which was used to elicit and determine respondents' expressed preferences.

Searches of existing literature did not reveal studies where preference for store design is studied in relation to product preference.

Objectives

With the abovementioned literature as a background, we propose studying retail atmospheres from a practical and process-oriented perspective, using actual customers' in-store preferences and behavior as indicators. Research investigating atmospheric cues in this manner is limited, as mentioned above, and where it does

exist, employs a predominantly qualitative approach. We contend that atmospheric cues are largely perceived unconsciously, and that qualitative methods using direct interrogation as a method of data collection are therefore inadequate. To address this deficiency, this paper proposes a method for discovering the extent to which expressed store preference spills over onto product preference, without bringing respondents' conscious attention to the store interior.

Tools for studying a store interior's effect on consumers should be of great interest to both retailers and design managers, both of whom have obvious interest in determining whether their designs are properly matched with their targeted market segment. The uncertainty surrounding how a design is perceived by consumers is often pointed out in design and marketing literature; designers, it is usually argued, are the ones who should both know and be able to realize the consumer's needs. John Heskett (2005), for example, acknowledges the conflicting imperatives between a company and the users of its products, and describes how the role of design needs to be understood as providing a bridge between them. Philip Kotler (1973) underscores the relevance of the designer's understanding of the consumer by drawing a distinction between intended and perceived atmosphere. Kotler defines the intended atmosphere as the set of sensory qualities that the designer of the store means to invoke, while the perceived atmosphere is the sensory qualities experienced by the consumer. As a further complication, perception can of course vary significantly from one consumer to the next. Further still, designers are employed by clients who typically bring their own perceptions and intentions to bear on the situation (Haug & Münster 2015; T. Kent & Stone 2007). Considering all these complicating factors and interests together, it becomes obvious that a reliable method for understanding how designs are experienced subjectively would be of indisputable value to decision makers at every level in the field of retail.

In order to delimit the study, we will focus our attention on the variables controlled by the designer: namely, layout, furniture, decoration, and display (Haug & Münster 2015). Using this method, we are able to investigate whether different store characteristics affect individual consumers' product preferences and determine the extent to which a highly rated store designs affects ratings of products inside the store. A strong correlation between store design preferences and merchandise preferences would indicate that interviews might in fact be a sufficient method of data collection; a weaker correlation would indicate, conversely, that perhaps this data is not as trustworthy as we'd like it to be.

Research Methodology

Experimental approach

The experiment was designed to investigate whether an interior, that a respondent has expressed a preference for, has a positive influence on the respondent's perception of the products in that interior. In order to determine this, various measurements from each participant were needed. The experiment was therefore designed to collect data indicating (1) each participant's preference for products rated in a neutral setting and (2) each participant's preference for products rated from within the different interiors, (3) each participant's preference for the interiors.

Ratings were measured for each individual. Preferences depend on individual factors like cultural and biological background, education, and personal experience (Kubovy 2000; Leder et al. 2004; Martindale & Moore 1988; Reber, Schwarz, & Winkielman 2004; Thurstone 1928), which makes aggregated data less useful. Each consumer is unique, in other words. Despite the fact that many marketing scholars study consumers by grouping them together at the aggregate or market-segment level, we contend that considering consumers as individuals will grant access to potentially latent information. The experiment was therefore designed first to take individual ratings, and then analyze this data to identify patterns and structures in the population (Krackhardt 1992; Wright 1997). The first part of the study was designed to measure the influence that the interior has on the product when presented in the store — the so-called spillover effect. The second part of the study was designed to measure an explicit preference, or lack thereof, for the store interiors. Comparing each respondent's expressed preference for a store with his or her highest rated product will tell us whether the product is indeed more highly rated in an interior that the respondent likes.

To measure the unconscious effects that interiors might have on products, it was deemed necessary to avoid drawing attention to the interior. To avoid undue reflection, respondents were asked to rate products while physically present in three different test stores. Respondents were therefore influenced by the interior

and its various cues, without knowing that the stores were the real subject of the questioning, and not the products.

Ratings were collected using a touch screen tablet which showed photos of the products taken in the respective environments, such that the hanger and background was visible in the photos (Photo 4). Preference for the products was indicated on a visual analogue scale (VAS) using rated, paired comparisons (Wright 1997). Moving the cursor left or right from center, the respondent indicates which of two products he or she prefers, and the relative strength of that preference.

Photo 4. For each pair of products, the respondent is asked to indicate his or her preference by moving the cursor on the visual analogue scale to a position that reflects the degree of preference to the products shown.

To add a control product rating, respondents were then taken to what we will call a neutral zone, outside the influence of the three test interiors. Here respondents were allowed to examine the products more closely, before rating each product again. Product ratings were again collected on a touch screen showing a photo of the product and a visual analogue scale running from 'I don't like at all', on the left, to 'I like very much', on the right. Respondents were asked to indicate a preference for the products by moving the cursor left or right of center. Any discrepancy between in-store product rating and product ratings given in the neutral zone is, we contend, attributable to the influence of the interior: the spillover effect (Model 1).

In the second part of the study, the same respondents were asked to observe the store interiors and rate them according to their personal taste. These ratings were once again collected on a touch screen tablet, which showed a photo of the store from the perspective where the respondent was standing with the researcher. Above the photo was the question: 'How much do you like this store?' and below, a visual analogue scale with 'I don't like at all' at the left endpoint and 'I like very much' on the right. Once again, the respondent was asked to indicate how much he or she liked the store design by moving the cursor left or right of center.
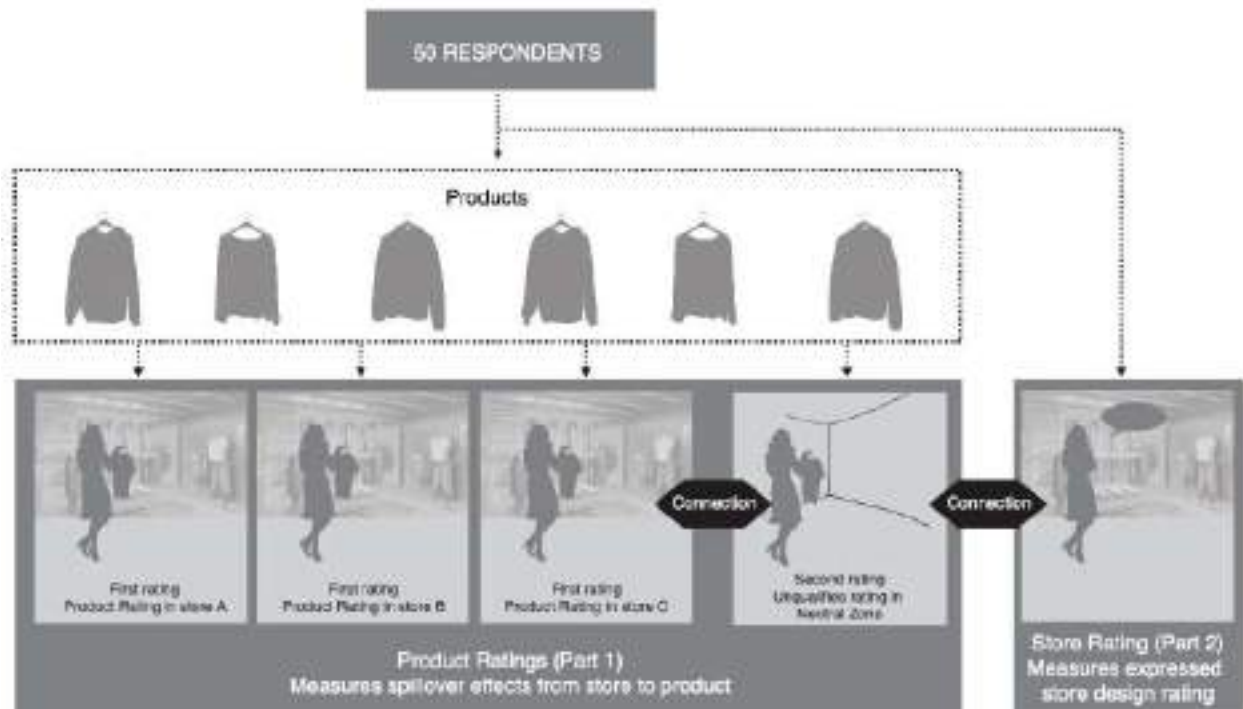
Model 1. In the first part of the study the products are rated inside three different test stores and in a neutral zone. In the second part of the study the design of the test stores is rated.

Comparison of results from part 1 and part 2 should indicate the level of correspondence between a respondent's expressed preference for an interior and that interior's spillover effect, if any, on the respondent's product preferences (Model 1).

Stimulus Selection

Before carrying out the experiment, field studies and interviews with retailers and retail designers were conducted in order to locate suitable test stores. The three test stores selected were in close proximity to one another, which was considered ideal. This would allow the researcher to guide respondents though the different environments without encountering additional, unintended atmospheres, which might influence respondents. The experiment was conducted in a European mall in 2015. The first 20 tests took place in February, the next 20 in March-April, and the last 10 in May. Respondents were actual customers who had entered the stores to view, try on, and potentially purchase the displayed fashion items, and were recruited upon leaving the store. The researcher explained that the experiment involved rating different products in the store.

Test Stores

Test environments were similar in size (between 31-39 m2), room height (4,5 meters), light intensity/quality, sound, and odor, in order to remove the influence of variables that are not always controlled by the retail designer (Haug & Münster 2015). Quantity of products displayed, and price level were also comparable between all three test stores. As mentioned above, it was deemed important to use test stores which were in close proximity to one another, in order to reduce the influence of external factors during the experiment. The test site was in fact a single men's store consisting of three separate in-shops, each specifically designed for three different men's fashion brands. Most importantly for our purposes, the design of each of the three in-shops was easily distinguishable from the other two. Furniture, wall coverings, floor materials, decoration items, brand images, hangers, and collections; each of these had its own separate identity in each of the shops. We will hereafter refer to the test environments as Shop A, Shop B and Shop C (Photos 1-3).

Shop A had a modern, industrial, bright appearance. All surfaces were white, and metal is a consistently used material. Shop B was characterized by a vintage look using different natural surfaces: brick-

walls, wood, and metal with a distressed or patinated look. Finally, shop C had a classical, elegant look resembling a formal men's wear department from previous decades.

The neutral zone was located in continuation of the fitting room area, which was shared by the three stores. While it is implicit in our premises that no interior space is completely neutral, what is meant by this is an interior whose atmosphere is outside the purview of this experiment. The interior of the area in question was, however, monochrome and dark, with no decorations or other products on display.

Photo 1 (left) shows Shop A, photo 2 (in the middle) shows Shop B, and photo 3 (right) shows Shop C.

Test products

Six men's tops were selected as test items. All items were priced from 40 to 55 Euros, which also corresponded to the mean price level for similar items in these stores. The same six products were presented in all three test stores and in the neutral zone, so it was necessary to use several copies of each product. Products were presented on front sticks on wall furniture, such that the front of the product faced the customer, and all six products were placed so that they could easily be seen from the center of the store, where the interview would take place. None of the test products were a part of the collections featured in the shops at the time of the experiment, but they were placed among the current collections as though they were. All items were presented on specially made hangers belonging the stores where they were displayed.

Participants

Of the 50 respondents, 31 were men and 19 were women, aged from 15 to 49 years.

Study

Pre-tests

Five pre-tests were conducted at the test site, in order to determine whether the test was comprehensible to participants, and to fine-tune the procedure. Evaluation of the pre-tests resulted in some slight adjustments to the procedure before proceeding to the 50 actual tests, which are included in this paper. In the pre-test, the six product combinations were presented in the same order in all three shops. Respondents understood the procedure easily enough but were confused by the realization that they were seeing the exact same products in each of the environments. In order to ameliorate this unsettling effect, we changed the order of the combination of products from store to store, to reduce this predictability. We also decided to inform participants at the outset of the interview that they would be presented with different fashion items, and that some of the items would be presented several times.

Procedure for Product Ratings (Part 1)

In-store Product Ratings

As a warm-up to the rating procedure, each respondent was shown a test sheet to familiarize them with the task. On a test screen, each respondent was asked to indicate his or her preference between two products on a visual analogue scale.

First, the researcher walked the respondent into shop A. While standing in the middle of the store, the researcher presented the respondent with two products at a time, asking the respondent to compare them (Photo 4). The researcher then presented the touch screen with photos of two products in the setting and asked the respondent to indicate his or her preference by moving the cursor to a position that reflected a degree of preference. The six paired comparisons were (product left, product right) ~ {(1,2), (2,3), (3,4), (4,5), (5,6), (6,1)}; this comprises the statistical design set. Next, the researcher escorted the respondent into shop B, where the procedure was repeated, this time with the products in a different order. The same procedure was then repeated a third time in shop C, with yet another ordering of products. The statistical design set was identical in all three shops; the comparisons were merely shown in a different order in each location. Data collected in this phase will be referred to hereafter as 'Product Ratings' or 'In-Store Ratings'.

Photo 4. In the stores, the research assistant presents the respondent with two products at a time and asks him to compare them.

Results and Discussion - In-store product ratings

The paired comparisons method allows us to determine not only how many respondents prefer, for example, product 6 over product 5, but also reveals the relative strength of the preference for each single respondent. Accordingly, separate preference structure for the six products and for the three stores, were calculated for each respondent. Product ratings were converted into numbers, one for each comparison, using the following method: The distance from the middle of the scale to the mark noted by the respondent was measured, positively to the right and negatively to the left. The observations are denoted $y_{i,j}$, $(i,j) \in D$. It is assumed that the numerical score will increase with the strength of preference for one product over the other product, and that equal but upper site preferences would correspond with equal but upper site ratings. For each subject and each room, the six comparison ratings, y_i, j, $(i, j) \in D$ were combined into a metric rating scale. Therefore, for each subject and for each room, there exists six γ's; γ_1, γ_2, γ_3, γ_4, γ_5 and γ_6, corresponding to the six products, so that the expected value, $E(y_i, j)$, of y_i, j has the form $E(y_i, j) = \gamma_j - \gamma_i$. The estimation of the γ's is performed using the least squares method. Preference-scores for the six products are calculated as: scores for product $i = \exp\{\gamma_i\}$.

Because respondents did not rate products individually, but as paired comparisons from within each space, the experiments and data from each of the test sites can be considered independent of the other two. It was therefore decided, that the importance of maintaining a natural flow from one space to the next outweighed the minimal risk of a mere-exposure effect, where a respondent might come to like a product or products more by being shown it multiple times.

Unqualified Product Ratings

In order to determine each respondent's product ratings when not influenced by the test atmospheres, respondents were then escorted to the neutral zone, where they rated each product individually. Chronologically, the neutral setting phase took place after the store ratings to allowed as much time as possible to pass between the two rating phases. In the neutral setting, ratings were collected using a VAS with the parameters 'I don't like at all' on the left, and 'I like very much' on the right. These ratings will be referred to in what follows as 'Unqualified Product Ratings.'

Results and Discussion - Unqualified Product Ratings

Each respondent's unqualified product ratings were converted into numbers by measuring the distance from the middle of the scale (0) to the mark noted by the participant. Positive scores from 1 to +50 to the right of zero and negative scores -1 to -50 to the left of zero. Products with high scores were considered to be products for which the respondent had a high degree of preference or liking.

Consumers buy products they like. To give focus to the results, it was decided to isolate the highest-rated product for each respondent. This was determined by locating each respondent's highest unqualified product rating. This product will hereafter be referred to as the respondent's 'Favorite Product'. Having established each respondent's favorite product, it was possible to compare the three in-store ratings for that product. Fig. 1 shows the ratings given for the favorite products in all three stores. The results show that favorite products on average were rated rater homogeneously in the three stores: The favorite products were rated highest in Store B (mean score 19.8), lowest in Store A (mean score 18.0), and slightly higher in Store C (mean score 18.3).
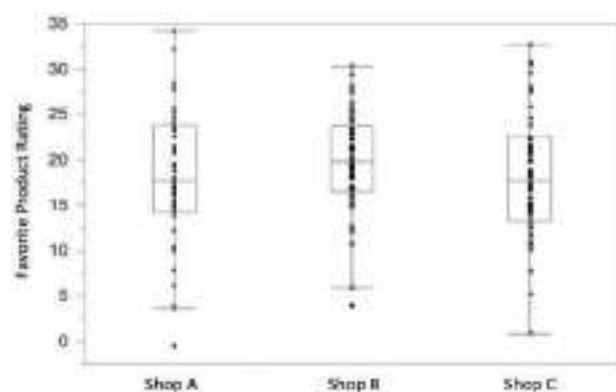
Figure 1. This Box-Plot covers each respondent's Favorite Product rating in store A, B and C.

However, when directing the focus on the one store where the very highest in-store rating of the favorite product was given, a more nuanced picture comes to view. Fig. 2. shows the highest in-store rating for each favorite product. Considering favorite product ratings in all three environments, shop A had the lowest impact on product ratings. In contrast, when isolating the store environment where the favorite products were rated the very highest, differences occurred: The mean score given in store A is now the highest (25.8) but is based on only 9 responses. The mean score in store C is almost as high (25.2), and is based on 13 responses, while the mean score in store B has gone from highest to lowest (21.7), but is based on a much larger sample size, namely 28 responses.

Fig. 2. This Box-Plot covers the highest in-store rating of each favorite product.

These two analyses show that we can in fact observe a measurable spillover effect from store design onto product ratings. We can see that the majority of favorite products (28 of 50) are rated most highly in store B, while relatively few respondents (9 of 50) rated their favorite product highest in store A. However, favorite product ratings given in store A are disce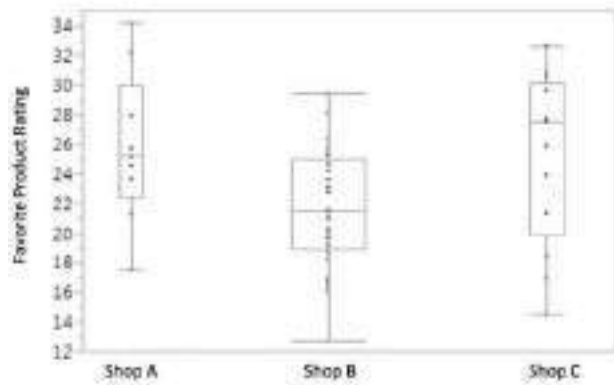rnibly higher than those given in the other environments. This is a compelling observation, showing that the proposed method allows us to understand specific tendencies within a population, which might be of interest to retailers and design mangers. If, for example, the group of respondents who rated their favorite products highest in store A turned out to be trendsetters or very loyal customers, design managers could make a solid argument for paying more attention to the ratings given by this group of respondents in particular, and for paying more attention to design cues in this specific setting. Thus, data collected using this method can describe and differentiate tendencies that might otherwise be obscured by aggregate methods, and thereby form the basis of new design strategies.

Favorite products are now established, and it was indicated how the different store environments impacted the ratings. But in order to answer the question 'Do consumers rate products more highly when they are presented in stores which they find attractive?' we will need to compare product ratings with ratings of the interior spaces themselves.

Procedure for Store Ratings (Part 2)

After rating the products in the stores, but before rating the products in the neutral zone, each respondent was returned to the stores, one after the other. At the entrance of each store, the researcher asked the respondent to look into the store and describe the interior of the store in their own words. This task was intended to focus the respondent's attention on the environment, as opposed to the products. These responses were typed by the researcher on the touch screen. For example, one respondent gave the following description of store A: 'white, cold, modern'; while another respondent used the words 'industrial, factory, bright'. Next, respondents were asked to rate each interior according to his or her personal taste. These ratings were taken on a VAS where 'I don't like at all' appeared on the left extreme, and 'I like very much' on the right. These ratings will be referred to in the following as 'Store Ratings.'

At the end of the interview, respondents were asked to provide their gender and age, and finally asked whether they would ever consider buying clothes from any of the stores in focus. The purpose of the last question was to eliminate participants who might have been in the stores for reasons other than shopping. This information was also typed on the touch screen and stored along with the data for each individual.

Results and Discussion - Store Ratings

Store ratings were converted to numbers by measuring the distance from the middle of the scale (zero) to the mark noted by the respondent. Positive scores (to the right of zero) from 1 to 50 were marked to the right of the midpoint, and negative scores (to the left of zero) from -1 to -50 to marks placed on the left. A high score was interpreted as a high degree of preference or liking for that store. Fig. 3 shows store ratings for all respondents. Store B (mean score 30.1) and store C (mean score 30.8) were rated highest, while store A (mean

score 21.1) was rated lowest (fig. 3). Store C was not only rated highest, but respondents were more closely in agreement in their ratings of store C than store A.

Fig 3. Box-Plot of the expressed store ratings for store A, B, and C.

Interestingly, store ratings fluctuated widely between the different periods of data collection. Notably, shop A's rating ranged from a mean rating of 11.7 in the first period to 30.8 in the second, and 21.5 in the third. The mean ratings of shop B and C were more consistent throughout. Since the only change in the stores from period to period was the product collections and their presentation, we surmise that these variations are the result of changes in product presentation. For example, during the first period shop A contained some discounted products, and the merchandise varied more than during the second period, where a professional merchandiser had just organized the collection, which might have left the store with a cleaner impression. This suggests that it is not advisable to evaluate store design in isolation, since stores atmospheres are always subject to some degree to the collection of products displayed within them. Products should therefore always be a part of any evaluation of a store atmosphere.

Comparing Product Ratings and Store Ratings

To find out whether a highly rated store design has a corresponding effect on product perception, the task remains to correlate favorite product ratings with store ratings (model 2).
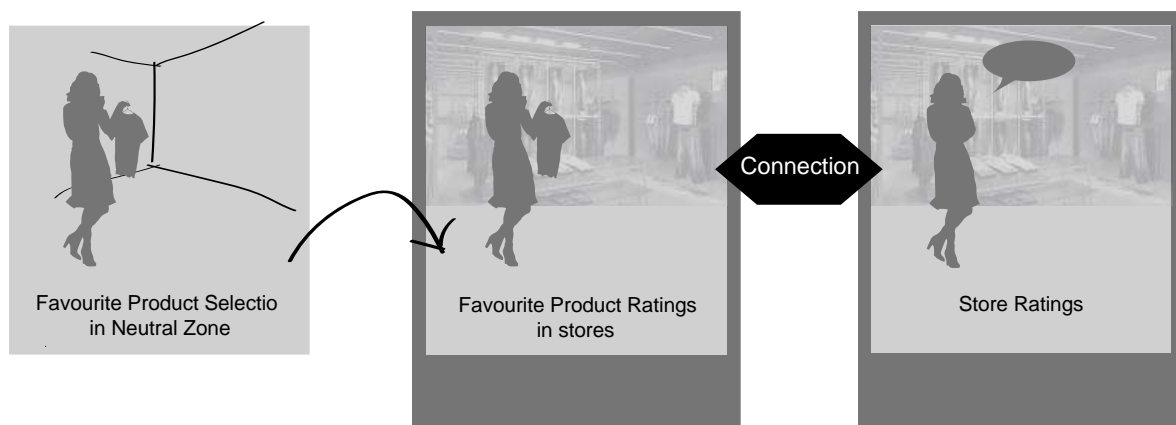
Model 2. Favorite products were selected, and the study was delimited to focus on in-store ratings of favorite products and store ratings.

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Each respondent reported three store ratings, and three favorite product ratings, one from each of the test environments. Linking store ratings with in-store ratings of favorite products in aggregate, we see a significant correlation (p = .001) (Fig. 5). However, if we consider the ratings given inside each store separately, differences occur. For example, comparison between favorite product rating and shop ratings from shop A for the same respondent reveals a positive correlation ($p < .001$) (Fig 6). But the same comparison for shop B shows a statistically insignificant correlation, $p = .206$ (fig. 7), and shop C also shows an insignificant correlation of $p = .708$ (fig. 8).
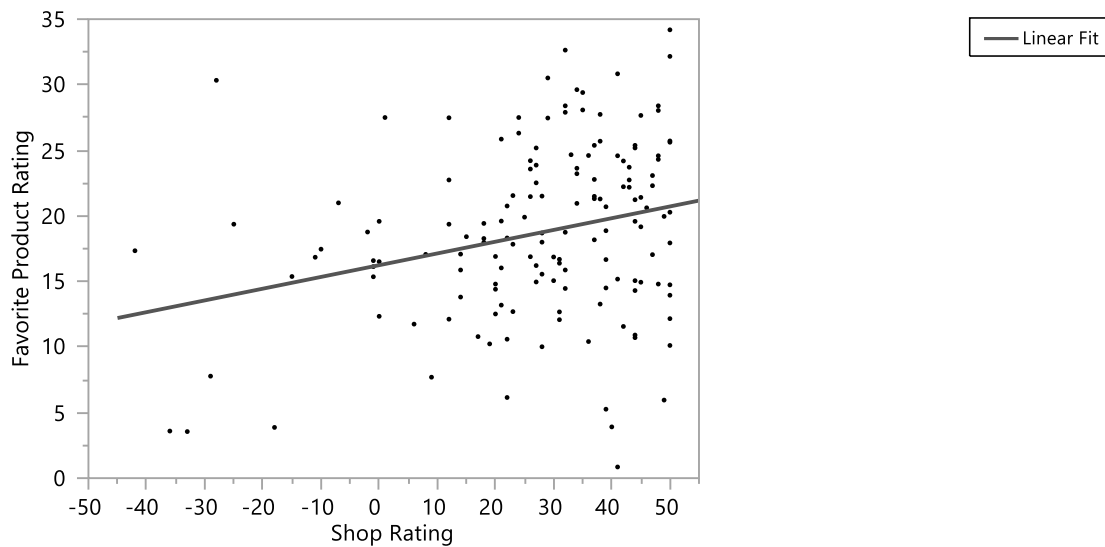

Fig 5. Correlation between Favorite Product Ratings in all stores against Shop Ratings. Linear Fit, Favorite Product Rating = 16,240478 + 0,0895712 x Shop Rating.
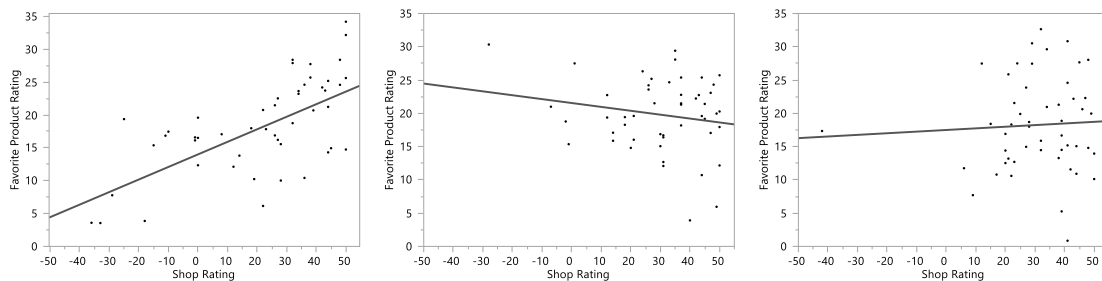
Fig. 6. Left. Significant correlation between Favorite Product Ratings against Shop Ratings in shop A (p < .001).
Fig. 7. Middle. Insignificant correlation between Favorite Product Ratings against Shop Ratings in shop B (p = .206).
Fig. 8. Right. Insignificant correlation between Favorite Product Ratings against Shop Ratings in shop C (p = .708).

In other words, taken in aggregate, a highly-rated store design seems to correspond with product ratings. But isolating the stores makes it clear that some designs influence product ratings more than others. In fact, only in the case of shop A a statistically significant correlation is found between favorite product rating and shop rating. Interestingly, shop A scored lowest among the three interiors in terms of its mean shop rating, (fig. 3), which seems to indicate a discrepancy between consumers' expressed preference for a store environment and that same environment's effect on their responses, at least measured in terms of product preference.

Conclusion and General Discussion

The review of the literature revealed a gap in scholarly understanding of whether a so-called spillover effect exists between store design and product preference. Given that interiors affect people in ways that they cannot necessarily articulate, this study's primary objective was to propose a method for determining whether store design preference spill over onto product preference in a measurable way, and to do this without bringing the respondent's conscious attention to the store interior. A field experiment was designed to

establish the extent to which a preference for three differently designed fashion stores affected the rating of fashion products from within those stores. Results from this project have theoretical, methodological, and managerial contributions to make. Each of these will be discussed separately below. Briefly: on the theoretical level, we expand theories dealing with the supportive aspect of retail design, and spillover effects; methodologically, we contribute to the study of the unconscious effects of interior spaces, and underscore the value of considering consumer data on the individual level as opposed to the aggregate; managerially, this project has implications for design managers and retailers, who can begin to understand the importance of how their designs are experienced by actual users, and how they might go about gathering this valuable information.

Theoretical Implications

The present study shows that individual consumers do indeed rate the same products differently in different contexts. From this we can conclude that there is a measurable spillover effect from context to merchandise, and that this effect has a relation to the design of the interior. Considering respondent data in aggregate, a significant correlation between preferred store design and product preference exists. But considering results from the individual test stores shows that store preference supported favorite products with statistical significance in only one of three stores. Thus, a well-matched interior design can have a supportive or enhancing effect on product preference. Results also indicate that the existence of a supporting effect from an interior is not something that the average consumer is aware of. The store that influenced the product ratings most positively, store A, was not the store that consumers rated the highest in aggregate; stores B and C were both rated higher, in fact. In other words, the enhancing effect does not necessarily go hand-in-hand with preferences that consumers express, which suggests that the practice of relying on consumer opinion, or on direct interrogation as a method of inquiry, should be viewed with circumspection.

Methodological Implications

Methodologically, the approach used in this study allowed us to investigate the extent to which atmospheric context and cues affected specific product ratings without directing the respondents' attention to the contexts themselves. Results showed a measurable effect. Repeated individual measurements enabled studying how each product's ratings were affected within various interiors, a methodological approach that made it possible to measure how much a particular store design influenced specific product ratings. This information cannot be gleaned from studying average or aggregated ratings. Focusing on favorite products revealed that most participants rated their favorite product highest in store B, but that the mean product rating in store B was lower than that in both store A and store C. In this way it is clear that our method of data collection and analysis allowed a more nuanced picture to emerge. Such information could enable decision-makers to define more specific consumer segments, allowing them to target these in productive ways.

Aggregated results indicated a positive correlation between store preference and product preference. On the surface, this seems to indicate that customers did in fact rate products higher in shops that they liked. But our individual measurements enabled the analysis of data from each store separately, which revealed that the effect was produced by only one of the three interiors, shop A. This observation underscores the risk of treating the average customer as representative of the market as a whole.

Managerial implications

The research presented here has several implications for retail and design managers. First and foremost is valuable information about how individual consumers experience retail environments, and how to access this information, which can be of obvious benefit in making strategic decisions about store design. For example, is it more profitable for a given brand to create a design that will appeal strongly to a smaller group of highly engaged customers, or is a broader, more lukewarm appeal to a larger consumer segment the better approach? In this regard, shop A was an interesting case: Individuals who preferred shop A also rated their favorite products higher in its interior. In fact, this effect was strong enough to have a significant effect on the average of all three stores. We can safely conclude that shop A's interior did indeed have a positive influence on product preference. Interestingly, shop A scored the lowest store rating of the three stores, which seems to indicate that managers should be very cautious about relying on consumer interviews to gather information about a store design. A qualitative study of the respondents who were most positively affected by shop A might reveal a small group of enthusiastic individuals, who lifted the average disproportionately. If these

specific consumers turned out to be just browsing and not willing to buy, an argument could be made for ignoring them. If, on the other hand, they turned out to be trendsetters, or loyal customers, a solid argument could be made for paying greater attention to their preferences.

Another observation that might be relevant for practitioners is the fact that the same stores were rated differently during the course of the data collection period. Since the store design was not changed during that period, this indicates that stores are perceived differently according to the products on display. In other words, the current collection and the presentation of the merchandise can significantly impact the overall impression of a store design. This is clearly relevant for design managers to bear in mind when evaluating store design concepts. The appearance of a store design cannot be considered in and of itself, as products themselves are an important part of the equation.

Limitations and further research

The method proposed and applied in this study has advantages and disadvantages. Advantages include the fact that real-life studies of store environments provide a more realistic assessment of their effects than artificial settings (Baker et al. 2002; Ballantine, Parsons, and Comeskey 2015; A. M. Kent & Kirby 2009; van Rompay et al. 2012; Spence et al. 2014). Disadvantages include the complications involved with performing research in actual stores, where control of all variables is difficult. Our research team faced challenges in controlling the location of the test products during the experiment; shoppers could—and did—walk away with test items when the researcher wasn't looking. Results also showed variations in store ratings among the different periods of data collection, which could indicate that the store environment as a whole is affected by changes in collections and displays. While this type of variation can be controlled in a laboratory setting, they are impossible to eliminate completely in a real-life, operating store environment. Furthermore, the possibility cannot be eliminated that respondents were distracted in one way or another during the experiment, and the possibility therefore exists that such distraction may have influenced the ratings to some extent. Having said these things, the state of mind present in an actual shopper in an actual store cannot be reproduced in an artificial setting, where the respondent will always know on some level that he or she is participating in an experiment.

Apart from these inherent complications, the following limitations deserve mention. First, the results are based on a field study with three stores, six products and 50 participants. The differences in the design between the three test stores were big enough that a difference was discernible, but it is conceivable— perhaps even likely—that bigger contrasts and wider stylistic variation would produce even bigger contrasts in the results. Next, none of the test products were part of the current collections; they were instead displayed as single items blended in among the collection itself. This somewhat artificial circumstance could also have had an influence, providing a clue for respondents that something was unnatural about the situation. We believe that possibility to be negligible for the results, however, since the same situation obtained in all test stores. But one possibility for making the experiment more realistic would be to select test products from the current collection in the test store(s). Doing so would also make it possible to record respondents' buying intentions in the different stores, which the present study did not address. It would certainly be relevant to know how many of the respondents actually purchased products from the study, with a view to finding out whether a threshold seems to exist where like equals buy. This data would be of obvious interest to retailers. Finally, the study was based on data from one mall, which introduces a geographic and cultural limitation; it was furthermore limited to respondents who were already in the stores, and therefore provides no information about potential customers.

With this background, we can suggest several directions for further research. First of all, it would be useful to establish a connection between highly rated stores and increased sales. Our study indicates that positively rated store atmospheres do in certain cases enhance product ratings but does not establish whether a highly rated store increases sales. Next, additional research on the particular environmental qualities or atmospheric cues that serve to amplify product evaluation is needed in order to determine whether other factors, apart from liking a store design, are at work. For example, it might prove interesting to employ our method to ascertain whether qualities like friendliness or exclusiveness have an influence, or whether specific interior styles affect preferences for specific products. It might be, for example, that specific kinds of atmospheric cues produce a feeling of well-being in consumers, that in turn creates a positive effect on their responses to products in that store, without giving them any explicit preference or liking for the interior itself. Additional research, including more complex, combinatorial studies, is needed in order to categorize the relevant influencing factors and their degree of influence.

The method applied in this study attempts to isolate unconscious effects that spill over from an environment onto objects within that environment and juxtaposes these results with evaluations of the interior gathered by direct interrogation. Combining this type of study with more detailed explicit responses from consumers might produce a more nuanced account of how specific design cues are interpreted, whether the effect is conscious or unconscious, and to what extent. In this way, the method used here can be applied to other variables in order to determine which, if any, variables are more important for consumers. With further development, the method could become an effective aid in choosing between different design solutions. Rapid developments in virtual reality technology make it easy to imagine applications of this method as a tool for choosing between highly detailed interior drafts. Use of methods like the one proposed here in a virtual setting would allow testing of interiors at a much earlier stage, which could save a great many resources.

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The Semantics of Design and Why They Matter

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Understanding the value of design in industry is a contemporary issue both in academia and industry. Many studies have been conducted using historical data, macro-level indicators, questionnaire-based tools, and abstracted post-hoc accounts of the value of design. However, very little research attempts to uncover direct insights from real-world practical experiences of designers in industry and how they negotiate the design-value space. This study uncovers rich qualitative, pragmatic considerations of how the value of design is operationalized in situ by design practitioners in industry through a series of 6 in-depth interviews. Initial results indicate that different designers undertake a series of different context-dependent strategies: these range from changing the narrative of the contribution of design based on the KPIs of the audience, to taking a non-action stance allowing for consequences and pressure from external stakeholders to help drive design in practice, as well as performing "designer-ly" activities under a different alias.

Keywords: Design, Value, Value of Design

Introduction

Over the years there have been several attempts to understand, measure and communicate the value of design to business in both industry and academia. Even though this is a contemporary topic, little progress has been made, as the mechanisms of operationalizing and mobilizing the value of design are still widely under-researched (Braga, 2016). Existing literature in this space comes from a variety of fragmented fields including design studies, design management research, economics, management, marketing, engineering, human computer interaction and information technology. A majority of the work that has been done in this space focuses on empirical studies that rely on questionnaire based tools, study macro-level indicators, and reflect on abstracted post hoc accounts of the value of design. To complicate matters further, there is no consensus on the semantics of design, its definition and how it manifests in organization (Heskett, 2005). Many design practitioners still struggle to explain their roles and justify their value within the organization (Heskett, 2005, 2017; Preece, Rogers, & Sharp, 2015) to corporate executives and management. There has been some shift in how design is perceived in organizations with even C-suite positions such as the Chief Design Officer, and design verticals being created. This focus however comes off as tokenistic to most wider organization audiences, who still do not fully understand the value of design and associate it with their own understanding of what design means to them, which can mean a multitude of things. Instead of evaluating the value of design by imposing a priori definitions and concepts of measurement as done in previous studies, this study aims to understand emergent behaviours and strategies adopted by design practitioners in situ to operationalize, mobilize and communicate the value of design to their daily work. We attempt to uncover deeper insight into how the design-value space is currently being negotiated and traversed, and how we as a community can look to learn from and rethink our approach to measuring and communicating the value design.

Attempts to measure and understand the value of design in academia date as far back as three decades (Dumas & Mintzberg, 1989; Hart, Service, & Baker, 1989; Walsh, Roy, & Bruce, 1988) but to this point have been unable to make a lasting impact on mainstream industry and practice. In industry leading business consultant firms today continue to publish reports that try to explain the business value of design (Warwick Business School & Design Council, 2014; PricewaterhouseCoopers, 2017; Accenture Strategy, 2016; Design Council, 2018; McKinsey Design, 2018). The widespread promotion of 'design thinking' as a strategic tool in industry has spearheaded a revival of the role of design in business (Dunne & Martin, 2006; Johansson-Sköldberg, Woodilla, & Çetinkaya, 2013). This has gained significant traction through the help of evangelism of firms such as IDEO, and the establishment of institutions such as Stanford's d.school and Hasso Plattner Institute (Brown, 2009; Camacho, 2016; Johansson-Sköldberg et al., 2013; Kelley, 2001). Design has been widely acknowledged by its evangelists as a competitive instrument (D'Ippolito, 2014; Hertenstein, Platt, & Veryzer, 2013; Heskett, 2009, 2017; Roy & Riedel, 1997; Verganti, 2003). Design management literature primarily focuses on the role of designers within organizations (de Mozota, 2003; Verganti, 2003)and how design can drive radical innovation in industry (Norman & Verganti, 2014; Verganti, 2008; Verganti & Dell'Era, 2009). However even with all the positive sentiment attributed to design there are still many challenges faced when attempting to convince conservative business management of its value as a necessity and not merely a nice-to-have luxury.

Defining design

One of the biggest challenges with trying to measure and communicate the value of design is that there is no universal consensus on its definition. It means different things to different people in various contexts (Heskett, 2005; Love, 2002). Designers therefore seem to find it difficult to explain what it is that they do to people outside their field. There also seems to be an unspoken, unwritten expectation, that all designers understand design, therefore whenever someone is talking about design they should be talking about the same thing. So one could consider that designers never really have to explain to each other what design is, therefore they are not practiced enough to deal with the outside world when it comes to explaining themselves. Many competing attempts have been undertaken to define design (Ralph & Wand, 2009) but the field remains far from adopting any of these definitions with consensus. A persistent difficulty relates to the fact that no definition circumscribes all of ways that the term is employed in vernacular use. Heskett (2005) suggests that "*design sits uncomfortably between [...] two extremes. As a word it is common enough, but full of incongruities, has innumerable manifestations, and lacks boundaries that give clarity and definition. As a practice, design generates vast quantities of material, much of it ephemeral, only a small proportion of which has enduring quality.*" As there are a multitude of manifestations of design, there will be many who are interested in the term but little agreement to what it actually may mean. So design may be defined by the very popular, almost canonical definition of "*Devising courses of action aimed at changing existing situations into preferred ones*" (Simon, 1968) or as abstractly as "*The performing of a very complicated act of faith*" (Jones, 1966). Studies exploring the definition of design cover over 42, very unique definitions of the term, all meaningful in their own way (Jones, 1992; Ralph & Wand, 2009).

Figure 1 Design Process by Damien Newman (https://thedesignsquiggle.com/)

The semantics of design

There are a number of related difficulties with design as a subject matter for research that we can discern.

Basic Semantics

A unique challenge that comes with the word design is how it can be used as so many different parts of speech, all grammatically correct, yet conceptually distinct. Heskett, (2005) illustrates this complexity with his very famously quoted, seemingly non-sensical but grammatically sound sentence "*Design is to design a design to produce a design.*" Design (noun), the concept or field, is to design (verb) the action or process, to design (another noun) the concept or proposal, to produce a design (yet another noun), the final product or realized output. In order to know what in particular is being called out by use of the word "design", we need to be mindful of the many ways it can appear in parts of speech, and to which of those senses it is currently being employed.

Family resemblance | process variance

There is also variance in manifestations of design as a process, which is similar to the notion of 'family resemblance' concept discussed in '*Philosophical Investigations*' (Wittgenstein, 1968). While any two design processes may share one or more manifestations, there is no single or determinate set of manifestations that would be common to all design processes (Walker, 1989). Our ordinary language criteria for applying the word "design" to any particular case is not predicated on there being a particular characteristic of that case that demands (or licenses) our use of that term (see Figure 2). If design is a family resemblance concept, this means that every attempt that has been made to define, or draw a sharp boundary around, our use of the term cannot both include all cases in which design would ordinarily apply, and exclude all cases where it would not. Definitions such as Simon's (1968) while clear, appear to include any human conceptual problem solving activity (including e.g. solving maths puzzles), and appear to exclude any design project in which designers do not have to deliberate new "courses of action" in order to bring about a new product or system.

Qualifiers

Similarly adding an adjective to design i.e. a prefix, a moderator – significantly changes what the term design might be doing or referring to. So while Industrial design is very different from textile design or interaction design, each of which may still have some semblance of commonality on some specific aspects, but wide divergences in other respects. Beyond different disciplines or domains of design, though, design has innumerable other modifiers as well. For instance, many different kinds of things can be designed: physical design, process design, service design, experience design, application design, event design etc. While some disciplines have particular emphases on some of these "objects" (in the grammatical sense) of design, e.g. industrial design traditionally emphasizes the physical, material, or tactile, there is no doubt that industrial designers are also engaged in designing experiences through products and systems.

Output variance

Additionally, there is further complexity even within the same sense of design on account of the fact that no two iterations of design processes which have been run following the exact the same procedures will result in the same output. Nelson & Stolterman, (2003) have discussed this aspect of design as the "ultimate particular"—that in many cases the point of design approaches, and one of their distinguishing characteristics, is that they result in novelty, not the reproduction of identical results. Furthermore, the outcome of one design process may result in more innovative solutions that can lead to an increase in user satisfaction; or on the flip side it may lead to cost savings. However both conditions may be mutually exclusive, and do not always intersect. The point is that we cannot use any predetermined outcomes of a design process as a means of identifying that process as design.

Popular culture

There are often certain narrow characteristics of design that as a result of popular culture or media have become more widely attributed to design such as aesthetics or graphics, which somewhat permeates what the concept as a whole entails, particularly when it is being discussed with those who are not very familiar with the field of design. This is something we encountered in our study.

Abject breadth of design

Heskett, (2005) comments on how it is interesting that design can operate as something very inconsequential and banal, but at the same time be very profound and meaningful. He sees this as an inherent characteristic of design, unlike many other concepts.

Needless to say, for reasons such as these design is challenging to study systematically, and it can be difficult or ill-advised to extrapolate measures or "findings" from one study to another. This is because simply any particular aspects of the multi-faceted phenomena of design that have been chosen to be brought into focus in any one study are selective, and rarely consistent across studies. While this study is not intended to act as a semantic analysis of how design is used in language, nor a genealogical exploration of the term over the years, it is important to understand how practitioners and industry understand it, to trace some of the many ways the value of design has been understood. Therefore it is argued that the semantics of design are important to understand, in order to comprehend how the design-value question has been addressed and answered in practice and research.
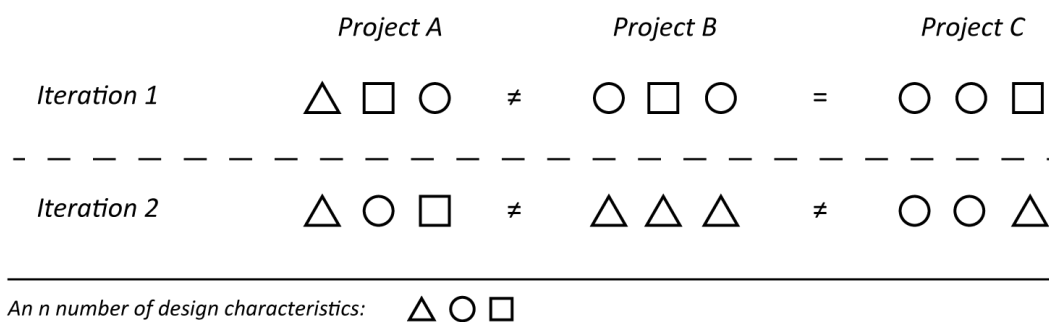

Figure 2 An illustration of the family resemblance concept w.r.t. the manifestations of design characteristics over multiple iterations of the same projects

Measuring design

Existing studies have attempted to create a wide range of measures of the value of design, but the range of these approaches is evidence of the disputed nature of the phenomenon. Practitioners themselves also struggle to explain what it is that they do, and what value that they bring to most of the organization. This raises a number of questions. Were the efforts in the previous studies made to explain and understand the value of design both in academia and industry insufficient? Is the impact that design makes to organizational performance not evident / visible? Is there something unique and distinct about design as a function, area of expertise that requires for it to find new and more convincing arguments for existence? Are design skills so overtly generic and non-specialized that just about anyone can be a 'designer', therefore there is no need to have a title ascribed to the practitioner of the field? Are the indicators used to measure design not representative of its presence? Or is it that designers are just terrible at communicating what it is that they do, and so are unable to convince anyone of what value they bring?

The value of design often manifests in ways that are tacit, intangible, and subjective – in turn making it difficult to measure (Dorst & Cross, 2001). Concepts such as gross value added (GVA), triple-bottom line, as well as service usability index have all been used to measure the design in action (Løvlie, Downs, & Reason, 2008) with the argument that as there is no direct financial metric relationship to quantify design, the context and actors dictate what is meaningful for measurement. Other studies have attempted to develop scorecards that can be used to gauge the value of design (Beltagui et al., 2008; Moultrie & Livesey, 2009; Westcott et al., 2013). That said the transient nature of design and its complexities are unable to be meaningfully positioned and captured in studies that analyse macro-level indicators and industry trends which are distilled into simple abstractions of value, such as for every "*£1 invested in design you get £4 profit*" (Design Council, 2007). If we look at design through the lens of the family resemblance concept (Wittgenstein, 1968), where any two design processes may share one or more manifestations, there is no single or determinate set of manifestations that would be common to all design processes; using the same tools (metrics, questionnaire-based instruments, pre-populated categorizations etc.) would be inadequate to measure the complexity of design. Good design of

physical artefacts is generally invisible to us, in that we mainly notice breaches in our expectations of how things should work as highlighted by Heidegger via Winograd, Flores, & Flores, (1986). The same holds true for intangible aspects of designer-ly actions such as well considered design processes, practices and actions. In the same light, if good executions of design become harder for us to locate and observe, they also become harder to measure. It is therefore asserted that the identification of design as a phenomenon is a problem of a wicked nature (Rittel & Webber, 1973).

Design disclaimers

When studying the value of design, there are two very important caveats to be cognizant of: i) Not all designers are the same, there are different types of designers, who understand and practice design differently. Having the label of the designer does not necessarily entail that one is in essence performative of designer-ly actions. This can be attributed to a multitude of reasons, ranging from everything from formal education in this space, practical experience, to others just adopting the label and taking on the mantle of a 'designer' for political expediency. ii) not all design is equal. Just because a thorough design process has been conducted does not mean that anything has necessarily improved, or value has been added. Naturally, there is a great deal of 'bad design' in existence. Design as a practice, even with all the potential benefits it may bring to organizations, is not the be all end all of improving business performance. Design is messy, it is practical, and it resides outside of the polished models and frameworks that project it as a simple process with predictable (and guaranteed) outcomes.

The social construction of the value of design

Design is seen as a social phenomenon (Bucciarelli, 1994; D'Ippolito, 2014; Suchman, 1987), that is situated within a given context and whose meanings are derived from the interaction with the space and actors – it thrives through social interactions (Petroski, 1985)

.Therefore it is imperative for us to explore how the value of design is constructed within the political, practical, and social landscape, between design practitioners and other actors in the workplace, and not just reduce the value to purely quantitative indicators. Therefore this study takes a slightly different approach to current attempts, and tries to uncover social conventions, behaviours and actions of designers in practice as evidence of how the value of their contributions to design are articulated and understood. This is based on the idea that if we as researchers have access to the rich and full complexity of design in action, why rely on historical data to attempt to explain what we can be observed in the present? i.e. the present is the best representation of itself (Dreyfus, 2002); and can provide us with a surfeit of rich contextual data that can help us construct meaning. This approach does not in any way attempt to take away from the body of work in existing literature that looks at understanding the value of design using historical, post-hoc data, but instead tries to further it, by trying to uncover the rich layer of contextual, social, practical considerations that are in place in situ by real world practitioners. Adopting this approach to study the value of design gives insight into previously unexplored spaces, and may help further extend our understanding in ways previous models were unable to.

Study Design

This study takes an empirical approach to understand how the design-value space is negotiated by practitioners - exploring how the value of design is understood, communicated and operationalized in industry. This orientation to the study design as a socially situated construct borrows from Mills's (1940) treatment of *motive* in his paper "Situated actions and vocabularies of motive." We consciously move away from the a priori understanding of constructs of design, instead focus on a socially situated, practiced, and observable design that may be interpreted and analyzed in light of the conditions it exists in. A series of 6 semi-structured, one-to-one interviews was conducted, with a purposeful convenience sample of participants who self-identify as design practitioners. On average the interviews lasted 37 minutes, with an open-ended discussion between the researcher and participants. There was no particular order to the discussion but guiding questions were asked to scaffold the discussion and prompt discussion. Questions started by trying to explore how the participants associated to design itself, *What kind of design title if any do you associate with yourself?* This was followed by exploring aspects of *How is design generally understood within the organization?* Leading into some of the more interesting probing questions of how the value proposition of design is operationalized based on audience, asking *How do you describe design to another designer?* and *How*

do you describe design to a non-designer? This then circled back into *how the value of design is communicated within the organization and what challenges if any are faced in doing so?* The idea behind the questions as a whole was to provoke discussion on how the value of design is understood, defined and communicated by participants within industry and explore what is the prevalent contemporary role of design within an organizational setting. This would also provide a window into how practitioners negotiate this discussion in their daily practice, as well as give insight into any emergent behaviour, actions and strategies that are used.

Table 1: Participant Information

#	Self-identified design title	Response to "Describe design to a non-designer"	Years in industry
A	User Experience Designer	*Design is what make makes [the best] sense of things*	0.5
B	Graphic / User Experience Designer	*Well what kind of design do you mean?...I think of it as something was designed a certain way so someone found a problem and created a solution for it and that is what design is I guess*	4
C	Product Designer	*I make products easy for people to use… that's easy for them. So I don't tell them it's graphic.. I just say if you use an app, I make it easy for you to use, more relevant for you, more easy for you to use. So I just make it simpler. I know it covers the usability part of it but that's the easiest way I could find to explain to them because if I go in more detail they assume its graphic related. So I really struggle at that point. So in layman terms I am unable to describe what I do…*	2.5
D	Front-end Web Designer	*[design is] …making things look pretty but not just for the sake of looking pretty… it's like usable - I read a quote the other day "don't make something unless it is both necessary and useful, but if it is both necessary and useful don't hesitate to make it pretty."*	5
E	User Experience Designer	*To me it's more just solving problems. Users have a problem with their application and it's your job to bring them a solution. It's a very abstract way of thinking about it, [but] it's the only way you can capture what design is.*	1
F	User Experience Designer	*Design to a non-designer… I think design is always misunderstood as just making things look nice but design is how sort of how things work how a product feels in somebody else's hand and just everything that comes with a product or an idea and experiences around that I think.*	3

Findings

This section presents results from the interview sessions, covering how designers adopt different strategies to position themselves and situate their work in relation to the organizational context. The findings are clustered into broad themes and excerpts from the participant responses are used to supplement the discussion.

You say it best, when you say nothing at all.

There are quite a few varied positions on how design value is mobilized for different participants. Participant A comments that there is no need to communicate the value of design, as no matter what effort is put into design work, at the end of the day it is the decision maker's prerogative of whether integration of the design

recommendations will make sense for the organization. Participant A comments "*Well to be honest, I won't [communicate the value of design], heh. They can listen to you but they won't agree with you…[imitating the decision-maker: 'This is what I want! I want - what I want.. [pause] Okay I have listened to you.. You have good recommendations and all that - but no. Thanks, but no thanks' Heh... So I learnt… there is no point in communicating the value of design*" It is instead argued that customers or clients can act as external actors who advocate the value of design – as more often than not the requests made by the customers are in line with the recommendations of the design team. This adds additional pressure on management to take design seriously – whereas design and designers are able to establish value through a passive positioning. This seemingly non-confrontational approach stems from the belief that "*Design is a creative process.. It's a creative spontaneous process.. Just like making a painting. So and if someone is calling [the] shots on your painting then it is not art anymore.*" So it dislocates itself from the actual control of the bureaucratic environment it is situated in – and creates pockets of freedom following an unconstrained design process, in the hopes that influence from outside the organization can nudge decision makers to take notice of their contribution and suggestions. It is a very passive position for the designers.

~~Design~~ is still design

Another interesting finding was how buzzword-compliance may be used as a strategic tool when used in line with the organizational lexicon. Participant C used the term 'UX' interchangeably with the word 'design' during the interview discussion. When probed as to why, it was indicated that when design was introduced to their organization it was done so from a top-down approach i.e. management had come across the idea and wanted capabilities built within the organization. This participant was part of the first recruits that were hired into the organization to form the design team, and was trained by a third party design consultancy for six months in order to become equipped with the knowledge of design and thereby become the so called 'design' expert within the organization. This however meant that their team was the sole propagator and advocate of design within the organization from an informed, trained perspective. However given the rest of the organization was not privy to the perceived benefits of using design within the organization setting, wrote it off being as arbitrary based on their own limited understanding and exposure to it. Participant C says "*We didn't pitch it as design, we pitched it as UX. we didn't even say UX design, because the way they were thinking of design was different. Y'know design is more graphical related, but when we pitched it as UX - user experience they didn't see the design, they saw it as improving the whole product portfolio, getting more customer retention and improving the customer experience.*" This approach had two consequences – it disassociated design from all the baggage that comes with the term itself, and at the same time allowed the type of work it performs to become relevant, in-fashion, contemporary expertise for the organization. This decision was not planned but the benefits of taking this approach were soon realized "*It was initially not conscious because it was supposed to be UX design and then people started to talk about UX! UX! UX! UX!… later [at] some point [we] realized that it makes sense to talk to people who did not understand what design is.. Because ...at that point the buzzword UX was spreading throughout the company so we were supposed to be the advocates for UX and the buzzword of UX was spreading so we wanted to ride that wagon - that hype wagon. At that point we realized that if we add design that it would lead to confusion and people would think what is UX what is design and we would start from scratch*" Dropping the alias of 'design' and adopting UX instead allowed the team to cash in on the opportunity of taking advantage of the popularity of UX, which had been making rounds as a buzzword within the industry and the organization. Disassociating from design also allowed for the team to be taken more seriously across the organization.

It's not [about] me, it's [about] you!

When communicating the value of design to stakeholders, it was also seen imperative for design to be positioned in terms of the key performance indicators (KPIs) of the stakeholder that was being addressed. This is seen as being cognizant of the transient nature of the value of design and how it is able to take on different output manifestations such as act as a 'cost-saver' or 'complaint-reducer' to 'sales driver' based on the project, context and stakeholder.

Participant B highlights how communicating the value of design is very difficult to peers who are unaware of the ethos behind it. They further add that they took a top-down approach to circumvent existing hurdles and barriers to adoption within the organization, based on cultures with high power distance e.g. convincing the boss/management of the value in terms of their KPIs and having that order being mandated on all staff in lower branches of the organizational structure. "*[the organization] was very hierarchical - so I didn't have to*

[convince my peers] I just had to go to the top person and they just tell the people what to do - so I didn't try to tell [my peers]." This again is seen as an active position / stance on how the value of design is communicated and dealt with within an organizational setting. Whenever the discussion of the value of the work of design within the organization was brought up, it was done so in the terms of the KPIs of who was being spoken to within the organization.

There are a few assumptions that were seen from the interviews as well. Most participants assumed that if they were talking about design to a designer – they were talking about the same thing; or that they shifted the type of design based on what the designer they thought they were talking to was referring to e.g. a UX designer would talk to a graphic designer in more visual aesthetic terms than to another UX designer. The above examples are placed to showcase the varied rich contextual nature of how the design-value paradox is negotiated by designers within industry.
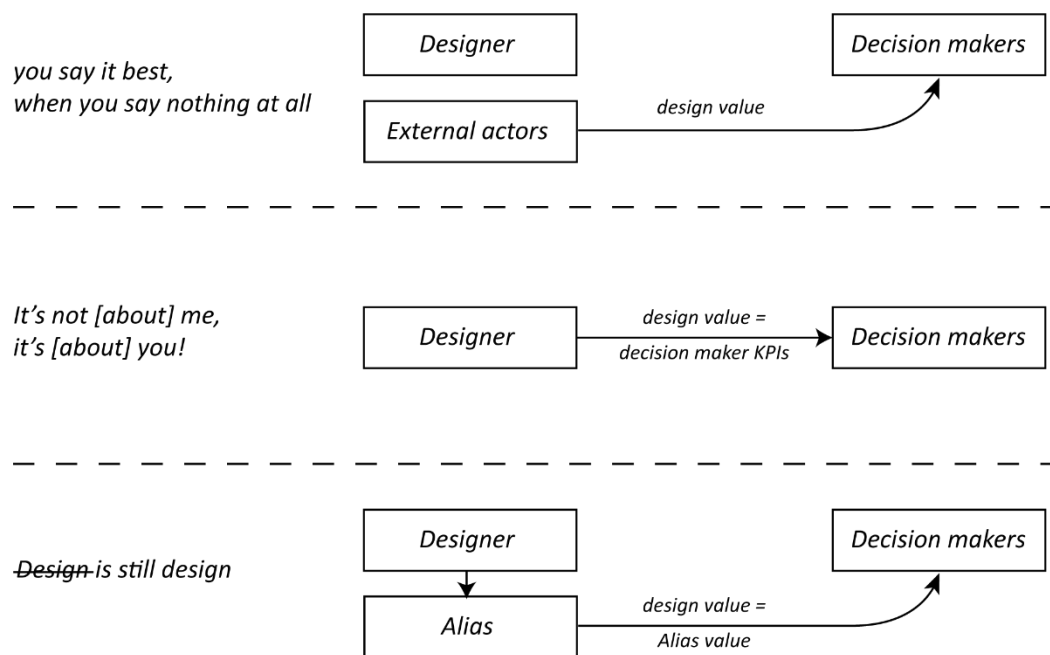

you say it best,
when you say nothing at all

| Designer |

| External actors | —— design value ——> | Decision makers |

It's not [about] me,
it's [about] you!

| Designer | design value = decision maker KPIs ——> | Decision makers |

~~Design~~ *is still design*

| Designer |
↓
| Alias | —— design value = Alias value ——> | Decision makers |

Figure 3: Different social conventions and strategies to operationalize design value by practitioners in industry

Discussion

The patterns of behaviour and emergent practices of designers that have been uncovered through this study are intended to act as exemplars of the possibility of a variety of different actions that design practitioners take as part of their daily work-lives. These are clearly not an exhaustive set of strategies or social conventions that are in place in the workplace today, but give insight into how different practices have emerged as a result of trying to address the design value question. Even with the limited scope of this study, We already start to uncover a window into the disparity in practical approaches to valuing design within organisations to what is conventionally being studied in literature. We hope this allows us to spur discussion and reflexive practice into what this means in terms of how we can re-evaluate and position our efforts in trying to negotiate the design-value space. We are also able to see how the multitude of strategies through which design value can be operationalized. This shows us the diversity of forms and roles that design is able take on to create an impact within the organisation. This highlights the transient, transferrable nature of design – where it permeates and transcends pre-prescribed functional boundaries.

Further work needs to be done in this space to fully appreciate the complexity of design in action. It can be asserted that we can advance in this work more meaningfully if we take a more anthropological approach, using ethnographic studies, or designing self-documenting tools that allow for design to be traced within the organization. Another consideration to think of is that there is a distinction between work that is labelled as

design in contrast to that which is 'designer-ly'. This distinction may not matter in most cases, where there is significant intersection, but at the same time there may be instances where designer-ly activities reside outside of the design-labelled boundaries of the workplace. Using immersive study techniques and tools will help bridge our understanding of how design can be meaningfully positioned, operationalized and mobilized to make greater impact to the industry. The three strategies that are presented in the findings embody the idea of design being a social construct, and here we see that it in essence is very dependent on the context (Bucciarelli, 1994; D'Ippolito, 2014; Suchman, 1987). Similarly taking on actions such as deciding to take on an alias in lieu of design, or re-appropriating the benefits of the work performed by design to another's KPIs as well as the political position of relying on external actors to influence propagation of design are all derivatives of interactions within the space and actors (Petroski, 1985).

Further investigation into different types of design fields may result in different strategies; organizations that have design as the core competency such as a design consultancy might have different permutations of strategies in place, versus ones where appreciation for design is still in a nascent state. Furthermore the duration of the experience of designers in industry may also act as a contributing factor to the strategies that are adopted. This study merely scratches the surface of what possible strategies and social conventions are in place in regards to understanding and communicating the value of design. There is scope for a lot more research to be conducted in this space.

Conclusion

The findings of this study present three distinct approaches to channeling the value of design from a practitioner's point of view to the wider organization. They touch upon some very distinct and interesting behaviours that are a product of the environment and context. Even with all the challenges that come with the semantics of design, as well as its nature, we see that from a practical perspective, designers are making decisions daily of how to best represent their work. The indisputable identification of design as a phenomenon, is only the first wicked problem in the thesis of this paper: this is a practical problem that today's practitioners are constantly attempting to resolve in the course of their work. Similarly the measurement of its value, however value is ultimately defined based on future studies, is also a distinct but cognate wicked problem in its own right. To this point we have begun to uncover some of the ways in which design is being operationalized and how its corresponding value is being articulated. Further explorations in this regard will help design practitioners explain and communicate the utility of design on an organizational front, and allow us to better trace how design lives within an organization. Design has often been portrayed as a strategic tool, a competitive instrument, a way of problem solving – but understanding how it is used by practitioners in industry, and how they use different arguments to socially construct the value it offers is of great benefit. This will open up a secondary stream of work exploring the value of design to industry, and uncovering rich, contextual, pragmatic ways to understand the value of design in organisations. This may also allow researchers to obviate methodological approaches that rely on a priori definitions of phenomena as a means of encapsulating something as dynamic and malleable as design.

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Communicating the Value of Design: Design Considerations to Assist Practitioner Rationale in FMCG Packaging Development

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Product packaging design is often produced through the practical application of tacit knowledge, rule of thumb and professional connoisseurship. Stakeholders are becoming increasingly demanding that design practitioners provide clarity of reasoning and accountability for their design proposals. Therefore, a better framework for the design of fast-moving consumer goods (FMCG) is required. This paper proposes a comprehensive taxonomy of *'design considerations'* to assist the development of low involvement FMCG packaging and aid in rationale communication for design solutions. 302 academic sources were reviewed, inductive content analysis performed to code topics and output validation with academic and industry experts (n=9) through a modified-Delphi card sorting method. The research provides movement towards a comprehensive framework and common dialogue between stakeholders, practitioners and managers to assist in more effectively communicating the value that design can offer to FMCGs. The constructed taxonomy provides a set of 156 *'design considerations'* to support in objective and informed design decision-making.

Keywords: Design Practice Management, Design Value, Packaging Design, FMCG, Taxonomy

Introduction

Within the FMCG industry, packaging design has the potential to influence consumers' perceptions of product and its value. The literature explores the nature of design activity but does not appear to take into consideration the broader contextual influences affecting the design of packaging. Packaging design practitioners have been characterised within the literature for poor rationale application in their decision-making process, potentially leading to the reduced market success of products (Barnes, Childs, Henson, & Lillford, 2008; Ryynänen & Hakatie, 2013). It is suggested that greater discussion between design practitioners and academics may further the understanding of design activity and benefit the design profession (Swann, 2002 p61). This paper aims to provide a more holistic perspective and understanding of the value that design can offer to FMCG products. This could lead to improved objectivity and rationalisation in design decision-making of practitioners and design managers by providing improved dialogue and understanding; In turn, improving the communication of design decisions and design value to stakeholders. Due to an emphasis on consumer-led research, packaging literature fails to fully explore packaging management and packaging designs important role as a core part of FMCG product development (Simms & Trott, 2010). Improved frameworks for the design of FMCGs is needed (Clement, Kristensen, & Grønhaug, 2013). Current frameworks

such as Ampuero and Vila (2006); Silayoi and Speece (2007) and Ryynänen and Hakatie (2013) provide some valuable insight into the consumer manipulation techniques design practitioners can and should apply. However, Clement, Kristensen, & Grønhaug (2013) suggest that research into a better framework for the design of FMCGs is required along with a taxonomy of design features. At current, the area of design management in FMCG packaging development is under researched (Simms & Trott, 2014b).

This paper which forms part of an ongoing PhD research project into UK FMCG packaging design and its design management discusses a more comprehensive description of influences affecting the visual appearance design of FMCG product packaging. The paper provides a preliminary framework, a taxonomy, that may be used in the future to support conceptual packaging design activity, in the generation and selection of concepts and to help emphasise to stakeholders the value of design through informed decision-making. The taxonomy, defined later in this paper, proposes a more complex ecosystem of *'design considerations'* for the development of FMCG packaging design. This study aims to provide a symbiotic interdisciplinary review of *'design considerations'* and presents them in a useable format for design practitioners, marketing and design managers.

The Value of the FMCG Industry in the United Kingdom (UK)

FMCGs can be defined as *"…inexpensive products that people usually buy on a regular basis, such as supermarket foods or toiletries."* (Collins English Dictionary, 2018)*. These types of products are low involvement, carry little emotional value, require low cognitive engagement and are considered low-risk purchases (Clement, Aastrup, & Forsberg, 2015; Holmes & Crocker, 1987). The UK FMCG industry is a significant sector within the UK economy and contributes to approximately £125 billion in consumer spending, around 8% of the country's GDP (Francis, Dorrington, & Hines, 2008). UK retailers alone have product portfolios of approximately 40,000 product lines, producing thousands of New Product Developments (NPD) requiring substantial amounts of design effort (Nancarrow, Wright, & Brace, 1998; Vazquez, Bruce, & Studd, 2003). Thousands of new FMCGs are launched each year, and large quantities of these will almost certainly fail at market (Rudder, Ainsworth, & Holgate, 2001). Consumers will approximately purchase only 0.7% of products available to them yearly (Simmonds & Spence, 2017). This increased competition between products at the point of sale has required companies to devise strategies to compete; hence, the modification of visual appeal and communication of brand intent through packaging design. This is seen as critical for consumer brand preference and essential for sales success (Karjalainen and Honkaniemi, 2009; Wang, 2013). Not only can packaging enhance commercial success for FMCGs; but, the influence packaging has on consumer cognitive processes is of great interest to corporations such as the Food and Drug Administration and public policy establishments (Underwood & Ozanne, 1998). More effective communication of nutritional information and health claims (Bialkova, Grunert, & van Trijp, 2013; Bialkova & van Trijp, 2011); or, highlighting product risks through packaging can potentially influence purchase habits and affect public health (Hammond et al.,2014; McNeill et al., 2017).

The Value of Design to FMCG New Product Development

NPD in the FMCG industry is considered vital. Incorporating the activity of design into packaging development is possibly the most significant factor for success (Wansink & Huffman, 2001). Developing or changing a product can be a risky activity to an organisation (Ryynänen & Hakatie, 2014); and, as a result, design offers opportunities as a valuable success factor for FMCGs in these complex markets (Rundh, 2009). Retailers are extremely competitive, and thus design is exploited as a strategic tool to develop value, differentiate products and increase brand equity (Vazquez et al., 2003). Products purchased in these retail environments are heavily characterised by a variety of different visual stimuli available to the consumer (Clement et al., 2013). Approximately 68% of FMCG retail purchases are unplanned, with 90% of consumers only observing the front of a package before making a choice (Stahlberg & Maila, 2012; Urbany et al., 1996). Furthermore, around 85% of FMCGs are chosen by a consumer while shelf facing (Clement et al., 2015). It has been consistently reported in literature that consumers frequently make purchase decisions influenced by a product's visual appearance (Bloch, 1995; Crilly et al., 2004; Fenko et al., 2010). Thus, the manipulation of the visual appearance attributes of packaging has become an increasingly effective method of creating differentiation amongst competing products; creating opportunities for more effective information communication and marketing strategies (Rettie & Brewer, 2000; Underwood & Klein, 2002; Young, 2004). This is key as consumer decisions are made in quick succession. Approximately less than eight seconds are spent in evaluating, analysing, and determining

a purchase (De Chernatony & McDonald, 1992). Hence, why the design of packaging has been found to be one of the most reliable forms of marketing for influencing consumer choice (Underwood & Klein, 2002). Inferences of product value are made from the first point of interaction between the product display and the consumer (Rundh, 2013). FMCGs, specifically those of low involvement, rely on these symbolic, aesthetic, semantic and visual informational cues to communicate and market product value (Becker et al., 2011; Clement et al., 2015; Creusen & Schoormans, 2005).

Understanding the importance and value design offers to exploit this marketing medium is crucial; but, in some incidents, companies do not consider the design or innovation of packaging until the later stages of NPD due to its low regard within the product development process (Francis et al., 2008; Simms & Trott, 2014b). Limited research and development budgets and cost savings are normally the focus of dialogue during the consideration of product packaging (Ryynänen & Hakatie, 2014). However, the expense of launching a new product that is ultimately unsuccessful will undoubtedly incur high costs for the company involved (Rudder et al., 2001). Only a small amount of FMCG launches will succeed (Rudolph, 1995). It is estimated that 70% to 95% of products are failing yearly across a range of consumer markets (Spence, 2016; Wells et al., 2007). Spence (2016b) proposes that the large proportion of failures could be due to current methods of consumer research and product validation working ineffectively. Reduced success at market has also been accredited to poor packaging design decision-making (Rudder et al., 2001). Spence (2016a) suggests visual attributes of the packaging can conceivably be the most critical cue affecting the success or failure of FMCGs. Even minor features of product packaging have been shown to have a substantial impact on consumer behaviour (Parise & Spence, 2012). Thus, basic design choices influence the consumer's first impression, often before physical interaction with the product (Noble & Kumar, 2010).

Stakeholders (for example brand, category and marketing managers) are increasingly demanding that designers gain more explicit understanding of the impact of design on consumer decision-making (Young, 2002). Practitioners can be referred to as *"gatekeepers"* who can change their industry (Ryynänen & Rusko, 2015); Yet, packaging solutions developed by professional designers may often be based on tacit knowledge; rule of thumb; and, professional connoisseurship rather than knowledge provided by research (Barnes et al., 2008; Ryynänen & Hakatie, 2013). Despite this, it still seems that the practice of design continues to rely on a designer's intuition, guesswork and self-expression (Swann, 2002; Taura & Nagai, 2017). A designer being able to explain their practice coherently and the rationale for decisions may bring greater credibility to their design outcomes (McNiff & Whitehead, 2011).

A significant body of consumer research exists to help inform designers, and many phenomena and principles that can be found in the literature could be utilised for product packaging design, however, much of the current knowledge on packaging has been described as *"…theoretical and remote"* from a design practice perspective (Ryynänen & Hakatie, 2013)*.* Potentially a better understanding of consumer-design interactions could lead to greater use of design as a strategic marketing tool (Ryynänen & Rusko, 2015); and, in turn, bring greater respect and appreciation to design as a discipline (Veryzer, 2000). Clement et al. (2013) suggest there is a need for further research towards a better framework for designing FMCGs. The following study describes the development of a taxonomy of *'design considerations'* that progresses towards an informed design process and common dialogue to assist in FMCG packaging development.

Methodology

Research aims to identify a comprehensive set of *'design considerations'* for low involvement FMCG packaging design. The intentions will be to begin the process of making existing research knowledge in this area more accessible and useful to packaging designers and managers. Additional content was gathered to expand the finding from the literature via an expert consensus seeking technique.

The following study was designed within the Loughborough University Ethics policy, following the data protection guidelines and authorised through an ethical approval process (Loughborough University, 2018). This study was designed to understand the key criteria and considerations for developing, evaluating and communicating the value of design in FMCG packaging. The research procedure was divided into four key phases to identify, define and validate a classification for the categories and topics extracted from literature. Inductive content analysis was applied to extract the key themes. The research design began with a structured literature review of packaging design and related disciplines. An expert panel of reviewers and a modified-Delphi card sorting study aimed to validate the terms gathered; and, provide a consensus of expert opinion and validation to cross compare academic research with expert insight. The additional content was added by

experts to expand on the current knowledge discovered in literature. For the purpose of this study, modified-Delphi Card sorting was selected over other qualitative, more traditional techniques to exploit the strengths of expert group decision-making. This was opposed to gathering accounts using methods such as interview to reduce bias where individual practitioners may try to render themselves more intelligible in their recall of accounts (Crilly, Moultrie, & Clarkson, 2009).

Phase 1: Structured Literature Review

The formal review aimed to extract possible topics of discussion including design elements, principles, interventions and considerations from a wide range of associated topic literature that would be useful to recognise and apply to the design process of low involvement FMCG packaging. The review process identified sources including journal articles, book chapters, PhD theses and other additional online sources deemed appropriate. Searching for these resources was bound using the variations on the key specific terms and phrases as well as wider search terms: '*visual appearance design*', '*product packaging*', '*packaging design*', '*FMCG*', '*low involvement*', '*visual perception*', '*visual attention*', '*consumer response*', '*consumer behaviour*' *and 'decision making'.* A bounding period ran from one of the first, notable consumer research study on consumer choice and visual attention to low involvement FMCG products by Russo and Leclerc (1994) to recent papers published in 2018. Figure 1 outlines the research strategy for the collection of data. This followed a structure adapted from Torrens (2017).
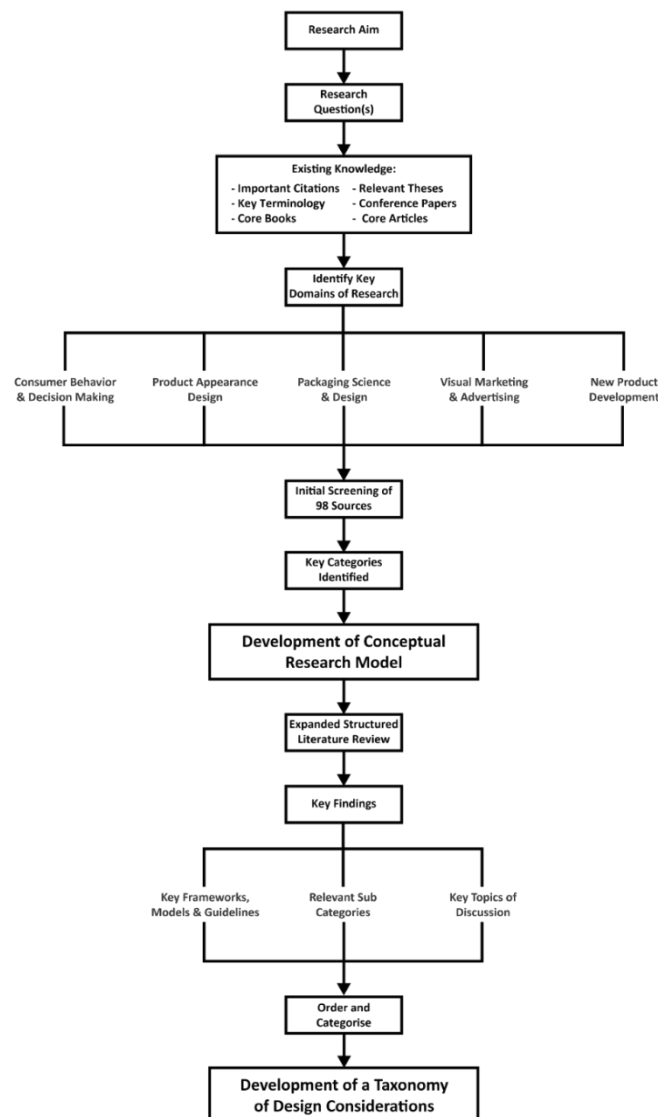

Figure 1. Adapted Research Strategy Model

A preliminary screening of resources was conducted before selection to identify topic categories. This was undertaken in advance to aid in the construction of a conceptual research model to identify key topic and content categories. Similar models can be identified in papers conducting summaries of research over an allocated period (see Luchs & Swan (2011)). This conceptual research model (Figure 2) was developed from frameworks, models and guidelines that utilised visual perception and information processing theories gathered from the review process (Bialkova & van Trijp, 2010; Clement, 2007; Husić-Mehmedović, Omeragić, Batagelj, & Kolar, 2017; Wedel & Pieters, 2008) and placed into an adapted cognitive-based consumer

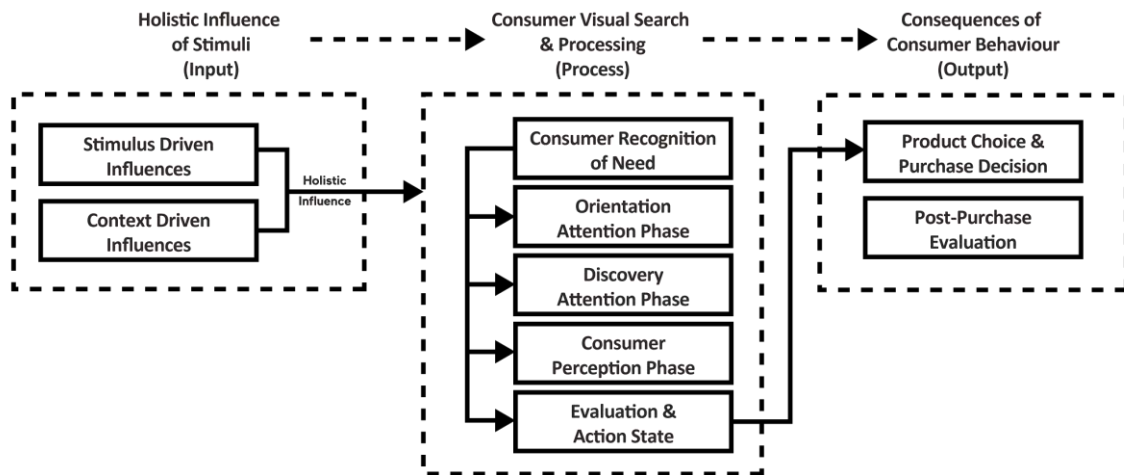decision-making model by Schiffman, Kanuk, & Wisenblit (2010).

Figure 2: Conceptual Model of Research & Classification for Low Involvement FMCG Packaging Design Considerations

This model aided the appropriate topic clustering and organisation amongst categories identified. The consideration set for source selection for the expanded structured literature review included: date of publishing, journal type, research aim, relevant keywords/topics of discussion, research methods used, relevant findings and proposition of topic relevant frameworks. An inclusion and exclusion criteria were established to assist selection. All sources had to be in English and relating to the topics of product appearance design, new product development, consumer decision-making, visual marketing, fast-moving consumer goods or packaging design. Additionally, the number of citations and the perceived reputation of the author of the source was also considered. Priority was given to articles from high-quality journals that were open to a range of interdisciplinary topic fields and double-blind peer-reviewed. All papers titles, keywords and abstracts were reviewed before the resource was considered. However, if a paper provided valuable insights in addition to this criterion, these were included subject to critical analysis by the informed researcher.
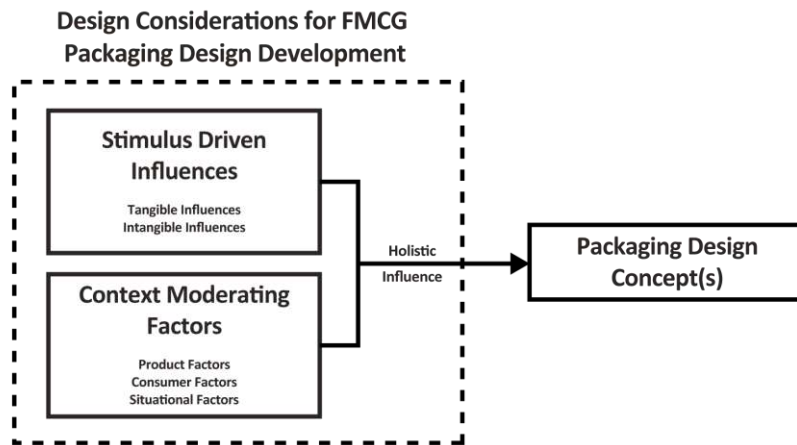
Figure 3: Conceptual Framework of Design Considerations for FMCG Packaging

Throughout the process, the researcher continued to reflect on the material being reviewed as new sources were discovered. The reference lists of the journal articles were also examined to identify any new sources that may be of interest that may not have been identified in the meta-search. For this study, precedence was given to the *'input'* section of the conceptual research model (Figure 2), and the development of a *'Conceptual Framework of Design Considerations for FMCG Packaging'* (Figure 3) resulted from the meta-search. The review process was concluded once a point had been reached where the articles selected from review represented a consensus of the body of research, reflecting the topics of discussion within literature and no new topics were being discovered.

Phase 2: Defining and Categorising Topics

Qualitative inductive content analysis was undertaken as a method to evaluate the resources, adapted from the method described by Elo & Kyngäs (2008). Content analysis can be defined as the systematic description of written, spoken or visual material to express themes, patterns; and occurrence of words, phrases, images or concepts. This allowed for the identification of common themes or patterns that emerge from data and indicate an order of priority. Units of terms could also the be clustered and reordered into a themed category (Hsieh & Shannon, 2005; Martin & Hanington, 2012). Investigation of the articles in this manner provides a systematic and objective method of analysis (Krippendorff, 2004). The process allows the researcher to distil words or phrases into fewer content-related categories when they share the same meaning (Cavanagh, 1997). The process identified duplicates or similar terms and phrases that could be categorised together under one term. Qualitative data was extracted in the form of words, phrases and quotes which were then recorded and referenced. These were then coded and clustered into themes to create more manageable topics. The process of coding and clustering is a conventional method for analysing qualitative data enabling researchers to collate meaning from a data set to develop theory (Robson, 2002). Through this process, greater validity may be given to any inferences made from the data (Krippendorff, 2004). Content analysis is a means to deliver concepts or categories to build up a model or conceptual map (Elo & Kyngäs, 2008). The data collected from this study was organised, categorised and recorded into a spreadsheet. The data provided justifications for each topic as well as an assigned description, examples of contextual quotes from literature and citations to link to relevant research papers. An initial taxonomy and nomenclature was produced by the researchers based on the outcomes of this structured review to be later compared, critiqued and developed against the outcome of the modified-Delphi Card Sorting exercise.

Phase 3: Expert Participant Panel Selection

A panel of expert participants was selected to review and validate the topics and content categories extracted from literature through modified-Delphi card sorting. The resulting outcome provided information structures based on the participants' collective interpretation of the identified topics and categories. Acknowledged by Paul (2008a p8) there is no strict consensus of participant numbers. Suggestions range from six to over thirty participants to gain a meaningful consensus. Soranzo and Cooksey (2015) suggested 8 to 10 participants are

needed to gain a meaningful information architecture for modified-Delphi card sorting studies. Experts were chosen from fields where they have *"…a personal stake in the resulted knowledge [sic]"* (Paul, 2008a p10)*.* For this study, an eight-expert participant panel was formed. Participants ranged in professional disciplines but all with relevant experience and significant knowledge of the FMCG industry. These included academics, packaging development specialists, product design consultancy practitioners, POS designers, packaging designers and FMCG marketing specialists. The participants all had experience of the design of physical artefacts as this is the current focus of the research. These experts were asked to evaluate the set of topic cards and categories extracted as well as to provide professional insight. Before the card sorting exercise, participants were asked to complete a short questionnaire. This included taking details on their gender, age, positions held, previous experience, specialisms and education. The information gathered aided the interpretation of their commentaries and to qualify their responses against their professional backgrounds (Soranzo & Cooksey, 2015).

Phase 4: Modified-Delphi Card Sorting

Card sorting was selected as a method as it can be used when comprehension and meaningful categorisation is critical. As a participatory design technique, card sorting explores how concepts or topics are categorised. The method was used as a technique to draw out mental models about a set of information and aid in the design or validation of information architectures (Paul, 2008a p8). Cards were printed with a topic or category on them, which participants were asked to sort. This aspect of card sorting can be used to highlight terminology that can easily be misunderstood or has multiple meanings associated with it. It can be used to create structures for information such as taxonomies (Martin & Hanington, 2012 p26). Participants organise the cards into groups that may be compared against a given predicted model produced by the researcher (Paul, 2008 p8).

Two approaches are usually taken; an open or closed card sort, as described by Spencer and Garrett (2009). Open card sorts are used in the pre-design stages of information structure development. This allows the participants to produce their own categories and identify where categories are not fully defined. The method can be used to *"…add new content to an existing information architecture or to test an information architecture by scoring participant results with the existing structure. [sic]"* (Paul, 2008a p8). In contrast, a closed card sort can be used to place cards into pre-existing categories that have been set by the researcher, which is a post-design method to validate or amend an information architecture (Spencer & Garrett, 2009). For this study, a modified-Delphi card sorting method was adopted from Paul (2008a p12-14), which utilises the principles and strengths of expert group decision-making from the Delphi method (see Okoli & Pawlowski (2004) for an explanation and key features of the research method) combined with conventional card sorting. These additional features of the Delphi method enable communication within a group while reducing the adverse effects of group work interactions (Geist, 2010).
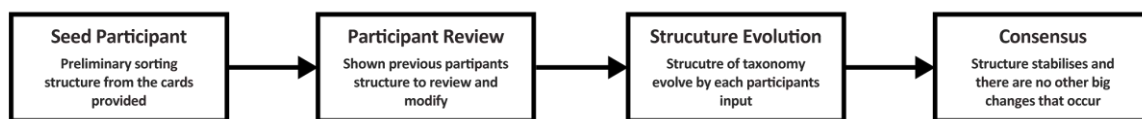

Seed Participant	Participant Review	Structure Evolution	Consensus
Preliminary sorting structure from the cards provided	Shown previous partipants structure to review and modify	Strucutre of taxonomy evolve by each participants input	Structure stabilises and there are no other big changes that occur

Figure 4: Steps for Conducting Modified-Delphi Card Sorting

Modified-Delphi card sorting may be compared to that of open card sorting as it provides the freedom for participants to modify, add or remove categories that fit their own interpretation of the model. This modified method allows participants to build upon each other's structures, giving a holistic result from all participants work combined. This is particularly useful when, as in this study, data sets are complex and more extensive; and, where there are high cognitive costs to the participants when undertaking the study (Paul, 2008b p12). There are four steps taken during the card sorting exercise (Figure 4). This method aims to improve the quality of results from each participant, reducing the time to conduct the study and analyse the results. The modified-Delphi method is ideal for measuring how people interact with the *"articulation of a taxonomy"* (Soranzo & Cooksey, 2015)*.*

For the seeding of the deck Paul (2008b) suggests multiple methods of opening the card sorting study. A single participant working alone; or, the pairing of participants for the initial categorisation. Alternatively, the assistance of an initial structure can be used where the information is new to the participants, and there may

be some difficulty producing an initial structure. Because some predefined categories had already been extracted by the researcher and the nature of the card sorting topics was relatively complex, category titles were provided to the seed participant. However, each participant was encouraged to evaluate the categories and add, remove or modify them. Participants were asked to distribute the topic cards amongst categories. Each card contained a topic name, associated terms and an assigned description gained from the initial phases of research (Figure 5).

Card sorting also enables the physical use of cards or a digital based card sorting option. For this study, physical cards were used as the range of topics were large, and a screen could limit the amount of information available. This allowed participants to physically interact and organise the cards and make notes. Participants were provided with an introductory script adapted from Paul (2008b p4). They were asked to add, remove or amend topics or categories using the blank index cards on previous participants structures. Participants were also allowed to distribute the cards into multiple categories by adding an index card to an alternative category. After each card sorting exercise, experts were asked to reflect on and refine their final structure. Towards the end of the card sorting study, fewer changes should be made; and, participants would only need to reflect on higher-level issues. Throughout both sections of the card sorting exercise, participants were encouraged to verbalise the decision-making process.
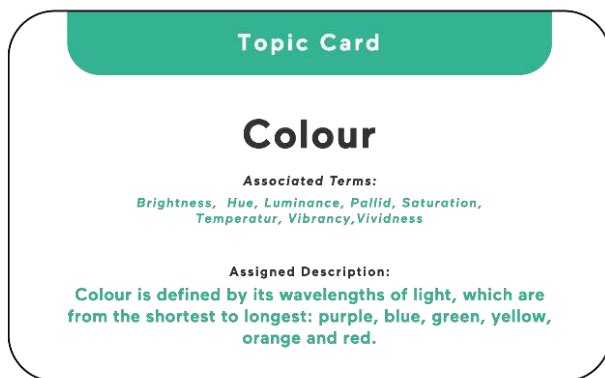

Figure 5: Exemplar Topic Card Design

Results

Except for the seed participant, no other participants knew the order in which they contributed or other *'experts'* who undertook the study. After each participant, structure data was recorded via photographs and transferred into a spreadsheet for analysis. Spreadsheets contained the topic categories with cards organised and distributed in each. If a new topic or category was added the text was recorded and highlighted to determine modifications (Paul, 2008b p4-5). Digital representations of each structure were produced to help further interpret data and compare the relationships between the topics and categories. Detailed analysis is only required if it is necessary to help in the description of mental models and evaluate the optimum term as the cards themselves provide enough data for information architecture construction (Soranzo & Cooksey, 2015). The first participant seeded the deck, and two new categories were proposed. Some category names and topic structures were challenged by participants 2 and 4, but a consensus was achieved by participant 5, with categories remaining agreed between participants 5 to 9. Throughout categorisation, the removal of only one original category occurred. Topics from this category were distributed into other categories. Overall, 9 categories were established in the final taxonomy. Participants 1 through to 3 focused primarily on the category design with minimal contribution to the contents of the topic deck. Greater changes occurred once the categories settled with the most additional topics introduced between participants 4 and 5. Participants 4 to 9 focused primarily on topic organisation as considerable changes were made at this point. Results suggest that significant changes were seen during participants 5 through to 7. However, changes were predominantly of topics derived from other topic cards. These participants produced cards to extend existing topics and add to additional categories. An example of this can be seen by specific variations of the term *"Technologies"* which was introduced as part of the original topic set. This was split into more specific topics associated such as *"Accessibility to Technology"* and *"Use of Technology".* Some new topics were introduced that were not discovered during initial content analysis such as *"Zeitgeist"*, *"Giftability"* or "*Influence from NPOs*" introduced

throughout the expert review. During the review of participants 5 and 7, this was where most of the changes were made. It seemed that participant 8 accepted most of these changes as almost none were made at this stage. To conclude, participant 9 made smaller refinements to the final taxonomy.

Agreement Weighting Analysis

This method, as recommended by Paul (2008b), is a way of understanding card importance and relationships agreed between participants. Data collected was distributed into a topic-by-participant category matrix to calculate agreement weighting. Percentages determined were then distributed into a topic-by- category matrix. Because participants could create their own category titles and add, remove or change topics with no restrictions, exact agreements across all participants can be minimal. Categories were then further grouped based on the criterium specified by Righi et al. (2013). Category titles were amended and final titles allocated. A second topic-by-category matrix was then produced with agreement weighting percentages recalculated. However, not all participants contributed to the agreement weighting of 32 topics. Additional analysis would be required to confirm these results and their validity. From the original 119 initial topics extracted from the 302 sources studied and reviewed by experts (n=9), an additional 34 (+21.5%) new, variations or repeated topics were added to the taxonomy. This brought the total topic count to 156 *'design considerations*.' An agreement consensus was determined if the topics received >50% in a category from all participants. If the topics gain a higher agreement percentage, the stronger the determination for the categorisation of that topic within the information structure (Paul, 2008a). If topic cards received ≤50%, these were arranged based on their highest agreement. If there were <50% or stalemates occurred, categories were then determined from analysis of the participant commentaries. From the original 119 topics, a consensus was not reached on 9.8% of topics. 32 topics (20.9%) did not gain a consensus from all participant due to these topics being added during the study. These would require additional evolution analysis. Although the nature of the modified-Delphi card sorting study allows for iterative development of the taxonomy, additional evolution analysis will be conducted to help understand why they were added and their relevance to the taxonomy based on comments noted during the study and reflection period post sort. Overall, based on the results of the final participant, the taxonomy saw an agreement of 86.27%, 10.12% disagreement with 3.27% of the cards being removed or combined with other topics. Further evolution analysis was conducted to understand participant decisions in greater detail.

Evolution Analysis

Areas of discrepancy were recognised throughout initial data analysis. Because of this, a heuristic approach to evolution analysis was employed as a secondary analysis technique. This method utilises data collected during the observations of the card sorting studies in the form of written notes and voice recordings. This identifies disagreements and weak points allowing the researcher to pay more specific consideration when analysing data. This additional strategy prioritises the final participants work relative to that of the previous, supported by any low or stalemated agreement weighting discovered from the previous analysis technique. Prioritising the final participant's design can help us understand why some cards were added, removed or merged throughout the development process of the taxonomy (Paul, 2008b).

In the case of low agreement weightings that did not meet the >50% threshold, for example, *"Consumer Research Involvement",* prioritisation was given to the highest category weighting of agreement from participants. However, in the specific case such as *"Memory"* and *"Memory Association"* prioritisation was given to the location of the final participant. Participants 6 through to 9 had placed these within the *"Consumer Factors"* category. As observed in earlier analysis, greater consideration was given to the location of topics once the category labels had been determined, only then was more focus given to topic location. As these topics remained in the same category from participant 6 to 9, reverting them to the previous category did not seem logical. Although they did not hold the highest weighting agreement, on examination of the taxonomy's development taking into consideration these other factors must be considered to understand why their location had changed. The same rationale was given to the topic *"Product Semantics"*. In cases such as stalemates between agreement weighting results, for example: *"Affordances"*, *"Cognitive Capacity"* and *"Cognitive Bias"*, arrangement in the taxonomy was based to the position given by the final participant. In one circumstance, a card was removed and then reintroduced in a later structure of the deck. *"Coordination"* was removed during the participants 2 to 6; however, participant 7 argued the reintroduction of the topic. Although the topic only received 33% in agreement weighting, the argument exhibited by participant 7 and inclusion by participants 8 and 9 determined that the topic should remain in the deck in the location

determined by participants 7 to 9. In certain incidences, topics were introduced by participants and then later merged or combined into other or new topics. *"Brand Ethos"* was introduced by participant 4, then later removed by participant 7 and combined into the topic *"Story"*. On analysis of these topics once more, the topic *"Story"* did contain sub-terms such as *"Brand Story"* which could be deemed similar. For this reason, the decision proposed by participant 7 will remain in the final taxonomy. Introduced by the final participant, *"Shopping Habits"* combined multiple consumer specific topics that had been introduced throughout the study. From the discussion in the reflective section of the study with participant 9, this was introduced as a more generic term to encompass conscious/subconscious habits of consumers and lowers the complexity of the taxonomy. For these reasons the decision made by participant 9 shall remain. At one point *"Marketing Strategy"* was removed and combined with *"Organisational Factors"*. On review of their rational, the evidence collected from the analysis of literature and previous appointments of participants, this decision was omitted. The topic was reintroduced into its previous location allocated. Overall, the card sorting exercise performed in the structure proposed by Paul (2008b) can be deemed as successful, and the researcher's feel confident with the results. The study aroused healthy debate, conflict and agreement to provide a set of validated considerations for the design and development of low involvement FMCG packaging. A revised conceptual framework can be seen in Figure 6. Although the final participant's taxonomy differed significantly from the researcher's original proposal, the addition of new categories and topics from the development and evolution from 9 participants have provided not only validation for the original deck, but additional knowledge and expertise that could not be gained from the researcher's alone. The final taxonomy is established in Figure 7.
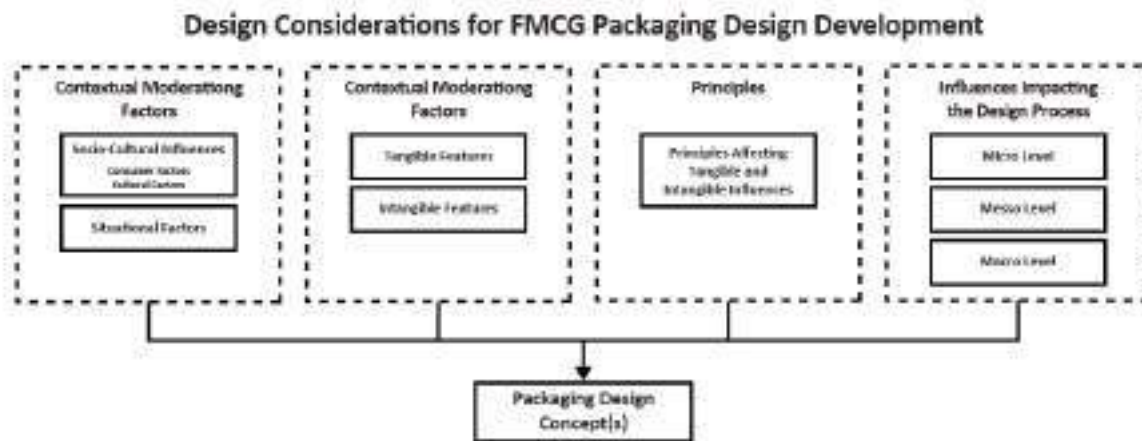

Figure 6: Revised Conceptual Framework of Design Considerations for FMCG Packaging
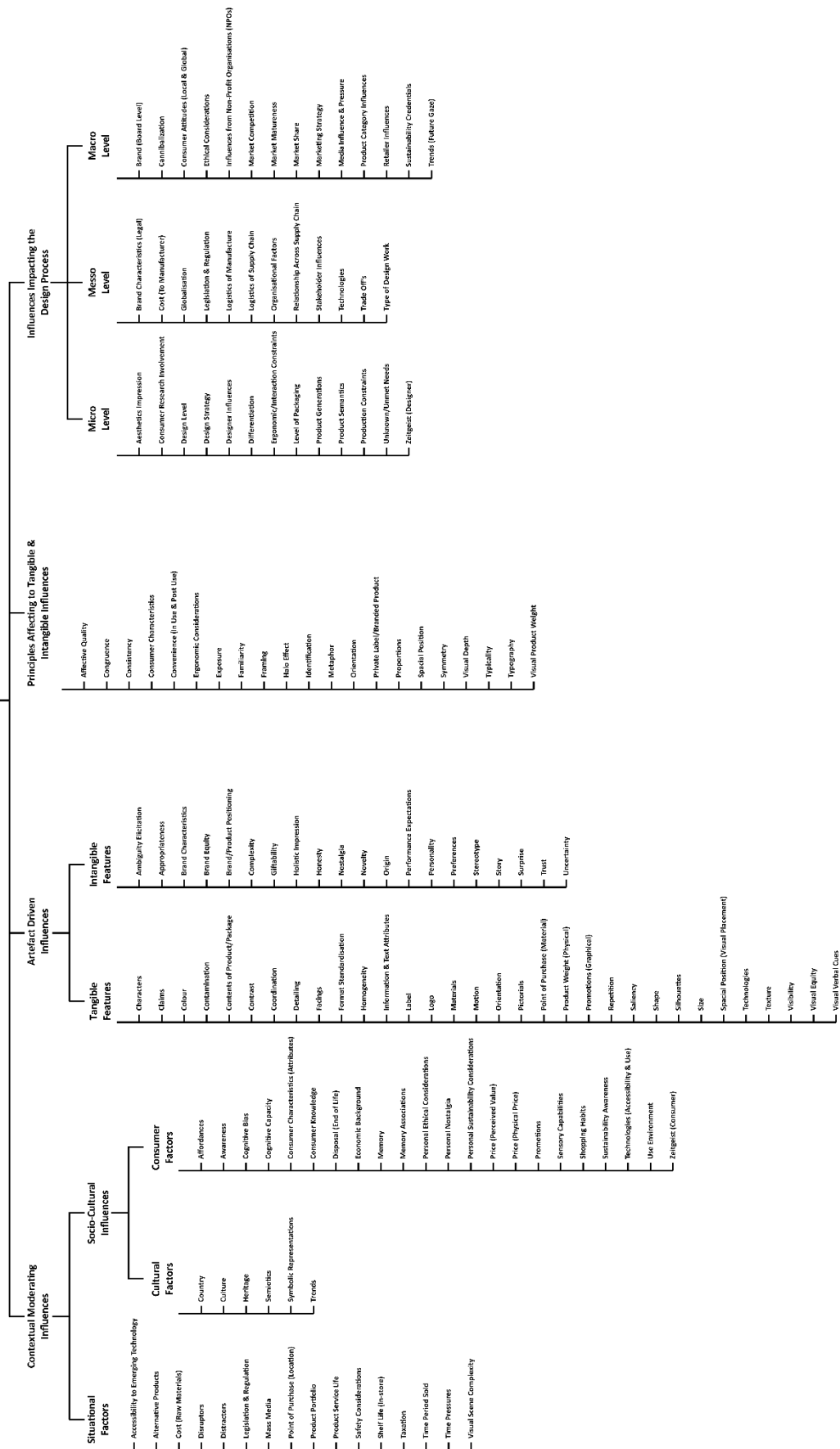
Holistic Influence of Stimuli (Input)

Contextual Moderating Influences

Situational Factors
- Accessibility to Emerging Technology
- Alternative Products
- Cost (Raw Materials)
- Disruptors
- Distractors
- Legislation & Regulation
- Mass Media
- Point of Purchase (Location)
- Product Portfolio
- Product Service Life
- Safety Considerations
- Shelf Life (In-store)
- Taxation
- Time Period Sold
- Time Pressures
- Visual Scene Complexity

Socio-Cultural Influences

Cultural Factors
- Country
- Culture
- Heritage
- Semiotics
- Symbolic Representations
- Trends

Consumer Factors
- Affordances
- Awareness
- Cognitive Bias
- Cognitive Capacity
- Consumer Characteristics (Attributes)
- Consumer Knowledge
- Disposal (End of Life)
- Economic Background
- Memory
- Memory Associations
- Personal Ethical Considerations
- Personal Nostalgia
- Personal Sustainability Considerations
- Price (Perceived Value)
- Price (Physical Price)
- Promotions
- Sensory Capabilities
- Shopping Habits
- Sustainability Awareness
- Technologies (Accessibility & Use)
- Use Environment
- Zeitgeist (Consumer)

Artefact Driven Influences

Tangible Features
- Characters
- Claims
- Colour
- Contamination
- Contents of Product/Package
- Contrast
- Coordination
- Detailing
- Fixings
- Format Standardisation
- Homogeneity
- Information & Text Attributes
- Label
- Logo
- Materials
- Motion
- Orientation
- Pictorials
- Point of Purchase (Material)
- Product Weight (Physical)
- Promotions (Graphical)
- Repetition
- Saliency
- Shape
- Silhouettes
- Size
- Spacial Position (Visual Placement)
- Technologies
- Texture
- Visibility
- Visual Equity
- Visual Verbal Cues

Intangible Features
- Ambiguity Elicitation
- Appropriateness
- Brand Characteristics
- Brand Equity
- Brand/Product Positioning
- Complexity
- Giftability
- Holistic Impression
- Honesty
- Nostalgia
- Novelty
- Origin
- Performance Expectations
- Personality
- Preferences
- Stereotype
- Story
- Surprise
- Trust
- Uncertainty

Principles Affecting to Tangible & Intangible Influences
- Affective Quality
- Congruence
- Consistency
- Consumer Characteristics
- Convenience (In Use & Post Use)
- Ergonomic Considerations
- Exposure
- Familiarity
- Framing
- Halo Effect
- Identification
- Metaphor
- Orientation
- Private Label/Branded Product
- Proportions
- Spacial Position
- Symmetry
- Visual Depth
- Typicality
- Typography
- Visual Product Weight

Influences Impacting the Design Process

Micro Level
- Aesthetics Impression
- Consumer/ Research Involvement
- Design Level
- Design Strategy
- Designer Influences
- Differentiation
- Ergonomic/Interaction Constraints
- Level of Packaging
- Product Generations
- Product Semantics
- Production Constraints
- Unknown/Unmet Needs
- Zeitgeist (Designer)

Messo Level
- Brand Characteristics (Legal)
- Cost (To Manufacture)
- Globalisation
- Legislation & Regulation
- Logistics of Manufacture
- Logistics of Supply Chain
- Organisational Factors
- Relationship Across Supply Chain
- Stakeholder Influences
- Technologies
- Trade Off's
- Type of Design Work

Macro Level
- Brand (Board Level)
- Cannibalisation
- Consumer Attitudes (Local & Global)
- Ethical Considerations
- Influences from Non-Profit Organisations (NPOs)
- Market Competition
- Market Matureness
- Market Share
- Marketing Strategy
- Media Influence & Pressure
- Product Category Influences
- Retailer Influences
- Sustainability Credentials
- Trends (Future Gaze)

Figure 7: An Interim Taxonomy of Design Considerations to Support Low Involvement FMCG Packaging Design

Discussion

This summarised account is leading towards a resource to provide practitioners, marketing and design managers with a detailed understanding of *'design considerations'* needed to communicate the value of their designs to stakeholders. It aims to provide terminology and understanding to open up dialogue for the rationale behind decision-making. A much more complex ecosystem of variables that effect the design process was discovered compared to what is presently considered. Although consumers can encounter packaged products in isolation, packaging pre-purchase is viewed almost always in the context of other products packages on store shelves in a retail environment (Deng & Kahn, 2009). This study has provided a comprehensive understanding of the holistic influences that can or should be considered in the design of low involvement FMCG packaging. This included a classification of the "*Artefact Driven Influences*" that provide the "*…actionable dimensions, features, and general product attributes a design team can manipulate in creating a product that attempts to meet design goals.*" (Noble & Kumar, 2010); and, the "*Contextual Moderating Factors*" that can affect the perception of the artefact and the latter perceptual processing on post-purchase evaluation of a product. Identification of "*Principles Affecting Tangible and Intangible Influences*" and "*Influences Impacting the Design Process*" was also established. Existing frameworks for packaging design, as identified earlier, do not include such a comprehensive list of *'design considerations'*. This taxonomy represents a means towards creating better frameworks for the design of low involvement FMCG packaging.

The taxonomy produced begins to develop a framework aiding design practitioners to begin to understand, evaluate and assess the designs they produce as well as begin to aid in communicating their decision-making by providing the understanding and terminology. The main purpose of this research was to identify a core set of elements and demonstrate their validity through expert review. This paper is a starting point in the conversation to bridge the difficulties between practitioners, researchers, managers and stakeholders through a set of key topics (terminologies) which provide a clear understanding of the considerations needed when executing new design development or redesigns for FMCG product packaging. Furthermore, this taxonomy could be utilised as a tool to be adopted by industry to assist with self-reflection on internal processes; and, communication in the design process to potentially help improve organisational knowledge management and skill auditing. It may also help facilitate communication with stakeholders to understand each other in the design development process by providing a more common dialogue; and, help effectively communicate with design practitioners internally or externally. The interim taxonomy presented is in an incomplete stage and requires improvement but offers an emerging insight into the final structure. Further work should be addressed to validate the 32 additional terms offered by expert insight.

Research Limitations

The dataset grew significantly from the original set provided by the researcher, based on a review of literature. Using more than 100 topic cards increased session times and fatigue of participants. Although more cards may be used if the participants are familiar with the content, large datasets often lead to confusion, tiredness and possible misinterpretation from participants (Paul, 2008a). Additional terms that were given by participants throughout the taxonomy development and validation significantly increase the data set. However, if not enough information had been provided to participants, this would have reduced the opportunity for a well-rounded and rich model. As participants were continuingly improving the taxonomy, lower cognitive costs were incurred; an advantage of the modified-Delphi card sort method. The selection of *'experts'* could be deemed as a factor that may have affected the results of the final taxonomy and terminology produced. Alternatively, more specific groups of 'experts' could potentially deliver a different outcome as these are less generalist to the group used in this study. For example, just marketing, design or academic professionals rather than a representative body from multiple disciplines. How might this affect the terminology categories and additional topics to the taxonomy? However, the researcher attempted to use a range of experts from a variety of relevant backgrounds to provide a more comprehensive and holistic contribution to the taxonomy terminology; and, capture a range of expertise in the field of FMCG design. The use of a multidisciplinary group was aimed to help reduce the bias of any one discipline. The topics introduced by the participants in the later stages of the taxonomy were not validated by all members of the expert panel. Although the nature of the study allowed this to occur, further validation of the completed taxonomy is required. Cultural context must also be addressed as a potential limiting factor. This study represents an insight from a UK perspective. However, this may differ if conducted in other countries where terminology and processes vary. Although bound to a selection of domains of research in the literature section including: packaging design, product

design and marketing/design management; this study may be improved with some more lateral thinking to gain further insight. This could be in areas such as user experience or service design. How might this affect the final outcome of the taxonomy? However, to gain an in-depth and focused investigation; and, due to time restrictions, additional insight gathering was restricted.

Future Research

There have been great efforts made within marketing management and consumer science research to understand the effect packaging elements have on consumer response and product perception in FMCG product categories. A baseline common dialogue, taxonomy and nomenclature, has now been established; and, validated as a set of *'design considerations'* for FMCG design practice. Future research should focus on the validation of the 32 additional topics identified by experts to authenticate their place in the taxonomy through further deductive content analysis of the resources gathered and through additional literature search. Future research should also look to understand how FMCG design practitioners implement, rationalise and validate design decisions in their design practice. Some emerging research has already looked to try to unravel and explore more in-depth FMCG packaging management with industry bodies (Simms & Trott, 2014a, 2014b) and individual FMCG design practitioners (Ryynänen & Rusko, 2015) through qualitative research methods and narrative report. Further investigations through the use of qualitative investigation methods such as case study, practitioner/key informant interviews, observations, document analysis or surveys to explore FMCG packaging design practice and management at a UK level. This could look to help the understanding from a personal account how packaging designers rationalise and validate their decision-making in real-world application; and, understand in more depth design management of FMCG packaging design development through industry-led research. This will contribute to the ongoing development of better frameworks for FMCG designers and support packaging design development.

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Track 3.d Introduction: How does design express value?

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A general view, often presented in a political context, suggests investment in design may create societal benefits, like economic growth, employment, competitiveness, and convenience. Conducted at a general level with aggregate variables, such measurements provide very limited insights and can even be misleading. A different approach takes a particular view of a designed artefact, object, system or service. Addressing the benefactors, users and consumers, we may be able to reach an individual value, which in turn may be aggregated to assess a market, KPI or similar.

How does design express value? And how can we measure the value?

To design is to create value for somebody. However, the value depends on who judges it and their and their personal values.

According to John Heskett;

> *"Design, stripped to its essence, can be defined as the human capacity to shape and make our environment in ways without precedent in nature that serves our needs and gives meaning to our lives". (Heskett, 2005).*

This suggests that artefacts, objects, systems and services, which are available to us, may influence and serve us in different ways depending on our position within a particular environment. Any artefact may affect our physical well-being. This reflects preferences and other values may essentially be emotions and feelings.

The four presentations represent a comprehensive view on how design create value, ranging from the more conceptual issues to the applications and applied situations where design is valuable.

Design capabilities for the evolution of value creation by Nicola Morelli, Amalia de Götzen, Luca Simeone Aalborg University, Denmark deals with the fundamentals of design as creation of value:

The process of value creation is not an exclusive preserve of designers, but the result of a diffuse problem solving capability. The creation of new value connected to the concept of innovation and can happen in different logical contexts, from limited and confined contexts (niches) to consolidated structures (regimes) and to wider sociotechnical contexts (landscapes). In all those contexts, design has a different role and whoever designs use different capabilities and tools. Furthermore, design capabilities are useful when aligning value creation and change in different levels, thus contributing to understand the relationships between small-scale interactions and wider scale transformation of sociotechnical landscapes. This paper proposes a framework to understand the contribution of design to the value creation process at the three levels, focusing on design capabilities and tools to work across different logical contexts.

Voorberg, van Buuren & Brinkman locate design thinking in connection with public services:

Design thinking is increasingly expected to create value by including service users in the fundamental aspects of services. In order to create value, the design approach needs to be 'translated' into an applicable framework, appropriate for the public domain. Therefore, we first explore what kind of value is generated within the public domain. Subsequently, by focusing on well-known contributions from the design literature, they review what can be learned from design approaches for value creation with users. They examine what kind of specific characteristics of the public domain needs to be taken into consideration, when one aims to apply a design-oriented approach in the public domain. Ultimately, we conclude how the design approach, can be made applicable within the public domain. In doing so, this paper aims to formulate stepping-stones for both academics and policy makers.

Wang and other locate design with branding: Emergent trends of co-branding strategies are increasingly being utilized in fashion marketing and retailing; as such, the role of design is becoming paramount in collaborative partnerships when devising co-branding strategies. In particular, designers are central to the process of collaborative partnerships when developing highly novel products more that are attractive to demanding consumers. This paper critically examines the role of cobranding strategies as a source of innovation in fashion marketing; and to understand how organizations draw upon co-branding to inform the development of new products, services and brands. Branding strategies, new product development, design, innovation, and fashion marketing are discussed and critically analyzed.

Cardall and Howell discuss design in a particular context of the Dutch design week:

Trends in design manifest in many ways. To identify meta-trends in contemporary design culture, we worked with nine student researchers to gather data seen during an academic trip to Dutch Design Week in 2017. The results indicated growing interest in four central themes: identity, globalization, technology, and production. From these themes, nine trends were outlined; social engagement, production consciousness, design for agency, material innovation, humanist design, humanity and technology, re-interrogating history, speculative design, and questioning the role of design practice itself. We noted a shift from narrative-driven to experiential designed objects and a change from individual expression toward communal experience. We also observed a discipline in flux as designers struggle with these large themes, object hood, and the role of the designer.

Discussion

The contribution demonstrate a wide variety of what design discourses on value creation offers today. Design is not isolated to particular people, but is cooperative and takes place within complex contexts of private and public spheres. It is also connected with business elements such as branding and the issue of design may serve as co-branding.

One critical issue concerns how we may measure the value of design. This is not a major issue in the value of design discourse yet. However, it is likely to become one in the future. However, there a several challenges to this. One is that designers and similar experts are doers more than analyzers and those who analyze like sociologists, marketing people and economists have severe challenges understanding and delimiting design in particular contexts.

A suggestion may rest on the following principles: Standard measurements in economics, sociology and marketing are quantitative and builds on aggregate data, referring to a population, a market, and a segment or similar. When referring to persons or individuals the reference is an average individual and there is usually no way to consider individual variation. The individual variation may be substantial, as our experiment below will show.

In design, we may want to measure values, experiences, expectations, adherence and preferences

It may be is based on a bipolar scale. Such a scale represents data collection in practical situations, like a person using her computer or smartphone to search information, a shopping experience where the person is located in a shop (or particular section of a shop) comparing a pair of items. These represent the comparisons by moving the cursor between the two items indicting which is preferred and even how much one preferred compared to the other. The scale has no number and each particular comparison is representing the values of the particular situation. The researcher may later use a numeric measure to indicate the numbers. Such a measure may become qualitative, but using statistical methods. It will take embodiments into serious consideration.

Further developments will take place and published in the near future.

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Design capabilities for the evolution of value creation

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The process of value creation cannot be an exclusive preserve of designers, but it is rather the result of a diffuse problem solving capability. The creation of new value is also connected to the concept of innovation and can happen in different logical contexts, from limited and confined contexts (niches) to consolidated structures (regimes) and to wider sociotechnical contexts (landscapes). In all those contexts, design can have a different role and whoever designs should use different capabilities and tools. Furthermore, design capabilities can also be useful when aligning value creation and change in different levels, thus contributing to understand the relationships between small scale interactions and wider scale transformation of sociotechnical landscapes. This paper proposes a framework to understand the contribution of design to the value creation process at the three levels, focusing on design capabilities and tools to work across different logical contexts.

Keywords: value co-creation, multilevel perspective, design capabilities

Introduction: design and value creation

The concepts of 'value' and 'value creation' have been discussed since Aristotle (Johnson, 1939). In the last centuries, such concept became the founding element of economic theories. The definition of such concept in economic terms would go beyond the scope of this paper, but two interesting paths can be followed, which make the concept of value creation relevant to reframe the activity of design.

On the one hand, some studies have spot a light on the logical difference between considering the value as a unit of market exchange or as something related to what happens in the phase of use (Lusch & Vargo, 2014; Vargo et al., 2008). On the other, a design perspective would focus on value not only in relation to the creation of the tangible reality of goods and services, but also on the role they play in practice and in the context of people's life (den Ouden, 2012; Heskett, 2017).

Following those paths, it is possible to move the centre of the value creation activity from the chain of production of products and services, to the moment and context of use. This is a fundamental shift in the way to interpret both economic processes and design actions. Furthermore, given the critical role design has in innovation process, it is possible to consider the role of design not only in radical innovation processes, but also in incremental innovation actions that everybody performs in everyday life.

This perspective shift would not exclude the relevance of design as a support to manufacturing or service systems, but would refocus such activity around the centre of value production and articulate it on different layers. Therefore, starting from this perspective shift, this paper will explore the activity of design at different logical levels of intervention, highlighting the abilities required to design at each level.

Changing views on the value creation process

The application of knowledge and skills for the creation of value is the fundamental basis in economic exchange. With this concept Vargo and Lusch (2004), later refined in other works (Lusch & Vargo, 2014; Lusch & Vargo, 2006; Vargo & Lusch, 2008) refuted the dominant view that material goods where the primary unit of exchange, to propose a view in which services, seen as exchange processes and relationships, are dominant (Vargo & Lusch, 2004). In Vargo and Lusch' view, goods are only resources for a process in an exchange of competences, that is the core of value creation.

This simple and plain ascertainment is in fact a substantial revolution in the way of interpreting the value creation process, because it changes the role of the actors and elements of this process. Goods are just part of an *infrastructure* that organisations create to offer a *value proposition* to service beneficiaries. Such infrastructure integrates resources (services, expert knowledge, products) to be used in the value creation process, but it does not constitute value *per se.*

The functional change of the elements in value creation leads to rethink the role and capabilities of the actors in this process. The customers (beneficiaries[1]) of the service are no longer passive, as they have the key role to co-creating value within a constellation of actors (Normann & Ramirez, 1994; Ramirez, 1999). Value is cocreated by integrating the infrastructure proposed by the enterprise and the beneficiaries' personal resources (personal knowledge, preferences, habits, problem solving strategies). This integration capability basically represents the natural problem solving attitude that is common to every individual; this is an attitude that depends on the capability to *device courses of actions aimed to change existing situations to preferred ones*, which according to Simon (1969, p. 55) is a characteristic of the design activity. The value co-creation process happens within a broader ecosystem (Vink et al., 2017), which includes values, implicit rules, regulations and knowledge, that is what Vargo and Lusch (2016) define as *Institutions* (Figure 1)
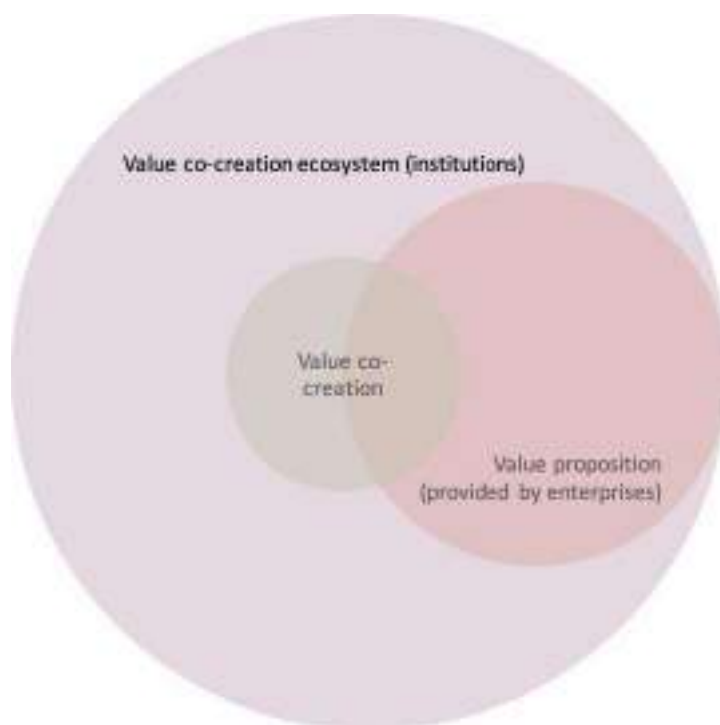
Figure 1 Value co-creation and its ecosystem

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[1] Vargo and Lush highlight the inadequacy of the terms *customer* or *user*, in respect to a process of value co-creation (because the customer/user is in fact also value creator). They prefer to use the term beneficiary, instead. This paper will therefore use the term *beneficiary* to indicate those who participate to the value-creation process by aggregating resources provided by other stakeholders (service providers, resource providers).

Redefining the design action

The recognition of the beneficiary's active role in service delivery and the revision of value creation as a design process within a network of relationships (Vargo & Lusch, 2016) poses the problem of redefining the characteristics of the design action and the role of design in a logical context in which the typical competence of designers - to envision possible desirable futures and to take action towards them - is no longer an exclusive capability of trained experts, but a diffuse one (Manzini, 2015).

The design perspective can be useful to link the process of value creation with some considerations about innovation in services. Design has often been considered as a crucial component in innovation processes (Brown & Katz, 2009), and as a driver of a specific kind of innovation, that works at the same time on radical innovation in technology and in the system of meanings (Verganti, 2009). Focusing on design as a diffuse capability however, makes it possible to zoom in, to the individual act of value creation - the everyday actions rather than the radical innovation – and back out, to analyse the systemic context of such actions. According to this approach, design is an attitude that informs the process of value creation at the microscopic level, but at the same time such innovation may imply change and evolution in the infrastructure that supports value creation, in the relationship between the actors that integrate resources for value creation, and even in the quality and modes of resource integration.

Every action of value creation is in fact producing new value, because it is producing something that was not there before, whatever the relevance of the novelty is (incremental or radical). In some instances, the value creation process is generating novelty not only in the value that is created, but also in the structure of the value creation ecosystem. Such change is often part of an evolutionary process, or the result of a process of social construction – i.e. a process of negotiation between social, cultural and technological instances of different social groups (Bijker et al., 1987) - which changes the structure of the value co-creation ecosystem at different levels. Unlike other evolutionary processes in nature, though, the changes produced by this process are deriving – though they are not the direct result of - from the ability of human beings to act through purposeful action, in other words, from design actions.

Innovation processes, a multilevel perspective

The evolutionary mechanisms described in the previous session refer to change and innovation at different scales. It is therefore interesting to analyse innovation processes in value creation systems in relation to the magnitude of change and to the design capability that comes to play, when working on different levels of innovation

Studies of innovation have provided useful conceptual structures to understand the mechanisms of change in complex systems. They have explained, for instance, the paths from invention to innovation (Nelson & Winter, 1982), the action of technological paradigms in selecting and directing innovation towards preferred trajectories (Dosi, 1982) and the relevance of large or incremental changes in scientific knowledge (Kuhn, 1962) The analysis and comparison of such contributions goes far beyond the scope of this paper, but a common characteristic of such studies is to focus on the tension between elements of change and elements of resistance to change, mainly embedded in infrastructures (services, organizations, rules, policies or institutions).

Such tension is the engine of a transition process that provokes different types of innovation, from incremental changes to technological revolutions (Freeman & Perez, 1988). This tention has also been studied at different scales, identifying different levels of heuristic analytical concepts: a frequent definition of such levels distinguishes between niches, socio-technical regimes and sociotechnical landscapes (Geels, 2010, 2012; Geels & Schot, 2007; Smith et al., 2005). Such levels are very useful to understand the insurgence, diffusion or consolidation of innovation.

According to Geels, and Schot (2007), **niches** are protected environments, like incubator rooms, in which innovation emerges, and is developed by a network of dedicated actors. Novelties, and especially radical novelties, originated by the action of outsiders and fringe actors can mature in such niches, protected from the adverse action of conservative forces, which tend to preserve the existing status and routines.

Socio-technical regimes refer to consolidated infrastructure and recognizable communities of experts, which stabilize existing trajectories through cognitive routines, regulations and standards. The solidity of such trajectories is essential for attracting investments in machines infrastructures and competences.

Finally, *sociotechnical landscapes* form an exogenous environment beyond the direct influence of regimes and niches actors, they represent the ecosystem of values, rules, regulations, cultural frameworks and institutions that shape innovation. The three levels also define different speed in innovation processes, with rapid and unstable changes in niches, solid and slower changes in sociotechnical regimes and very slow changes in sociotechnical landscapes. Change, however, does not simply happen within those logical levels, but also across them: niche changes create pressures towards regimes, landscape changes press for regime transitions and destabilization of regimes creates opportunities for niche innovation.

Niches and socio-technical regimes have similar kinds of structure as both are driven by the purposeful action of a community of actors, although the interaction among them is regulated by explicit rules in regimes, whereas it is unstable and depending on implicit structures in niches. Niches innovation is based on unstable aggregations of actors, whereas regimes have a consolidated aggregation, where mutual motivations and interests are binding the actors. The rules that govern the interaction at both levels have different nature: regulative (regulations, standards, laws), normative (relationships, values, behavioral norms) and cognitive (belief systems, pragmatic knowledge, problem definition, search heuristics). Such rules are essential for enabling actions - thus empowering and amplifying their effect - and legitimating them or delimiting their action, when their impact tends to be disruptive. Innovation, however, is often depending on how such rules are interpreted and possibly broken to generate new rules.

The socio-technical landscape instead does not influence change directly, but rather by providing *gradients of force*, i.e. the substrate of values, policies, knowledge, on which niches and regimes are based. Change at this level is much slower, but it can indirectly determine turbulence, shocks, disruptive phenomena or support *avalanche* changes (i.e. a number of uncoordinated changes of multiple dimensions at the niche level) (Geels & Schot, 2007).

Multilevel innovation perspective and the structure of value creations systems

The multilevel perspective proposed in the previous section is providing an operative framework to understand innovation processes, but how can this structure be used to read and understand concrete changes in the value creation processes? How is purposeful action (or design action) working at the three levels?

The service- dominant logic, proposed in the first sections of this paper, considers value creation as uniquely and phenomenologically created by the beneficiary, although such process happens through the interaction of multiple actors, and is coordinated through actors' generated institutions and institutional arrangements (Vargo & Lusch, 2016). Every instance of value creation is by definition creating something new, however most of the value creation actions are clearly framed in a system of normative, regulative and cognitive rules. For the scope of this paper, the focus is on the mechanisms of innovation, that is, on those novelties that bring about changes in the structure of value creation (i.e. the network of actors that contribute in the value creation process) or in the way resources are integrated.

Every time individuals or groups use a product (e.g. a car) or a service (e.g. public transport) they create value by integrating their personal knowledge (e.g. how to drive a car, where to sit or when to step out of the bus), knowledge deriving from rules and standards (e.g. driving rules, rules to access to the bus service) and knowledge embedded in their products or services (e.g. the car, the bus, the bus driver). Innovation in the way knowledge is integrated could consist in the change of the interaction between those different kinds of knowledge, e.g. assisted driving, or a different way of paying the bus ticket. Within a niche of a specific service, this change could be integrated into a more complex interaction structure (e.g. new interaction systems for a car or a new app for paying the ticket in the bus). This structure could be limited to a specific context, e.g. a neighbourhood in which specific infrastructures have been installed, to support autonomous or assisted driving, or a bus line in which the new ticket system is implemented. The confined environment of the niche creates an error friendly environment in which it is possible to create small experiments, that could eventually produce larger changes. The persistence of an element of novelty within a niche may encourage the definition of a more solid organization (e.g. a local service) which can be built by codifying the interaction among the actors in the niche or formally organizing the resources available in the context (for example organizing a network of charging spots for electric cars in a town, or creating protected lanes for self-driving vehicles).

The pressure for broader regime change comes when innovation structures in the niche reach a level of maturity that allows replicability and scalability. The regime includes large organizational structures, such as service organizations, public service systems or infrastructure. Such infrastructure has been designed and codified, in order to support *routine* procedures, which in fact facilitate any form of value creation that is compatible with them. The resistance of this infrastructure to the pressure from niche innovation derives not only from the conservative behaviour of the communities within those structures (organizations, administrations) but also by the solid framework they derive from, which privileges compatible forms of value creation. The resistance also depends on the solidity of such framework, where moments of weakness, frictions between regime structures and the sociotechnical landscape, can reduce the resistance to niche innovation. This is happening for instance, when increasing pressure of environmental concerns on the existing production systems, require a substantial infrastructural change (such as a shift in the energy production systems); in those cases, niche innovation can wedge into the regime weaknesses, to propose a new infrastructure. Unlike the experimentation activity of niches, the creation of novelties at the regime level requires a purposive and codified behaviour that justifies the new structure and aligns it with the sociotechnical landscape and with other existing structure at the regime level.

Unlike niche and regime changes, landscape changes are not directly depending from purposeful actions of communities or individuals. They are slow, evolutionary changes, often triggered by shocks, turbulence, or disruptive phenomena (Geels, & Schot, 2007). The sociotechnical landscape is the logical level of institutions, as described by Vargo & Lusch, (2015). Institutional change consists of cultural change, or change in large political trends or broad geo-political patterns. The disruption can come from traumatic political issues, large and rapid migrations or evidences of environmental changes. Changes in sociotechnical landscapes are obviously influencing niches or regimes, as the rules and knowledge at this level may gradually come to collision with regime structures that are no longer adequate (e.g. the progressive inadequacy of existing public administrations in respect to the growing pervasiveness of social networking) and can support or hinder experimentations and multidimensional innovations in niches. Even at this level, purposeful action could have an effect, in defining policies or governance structures, that trigger new political and governmental landscape.

Design and value creation in a multilevel perspective

The previous section highlighted the opportunities for purposeful action to generate innovation at different levels of the value-creation structure. This section is instead zooming-in the purposeful action at each level to describe its design specificities.

Design and the value creation in niche contexts

The very moment of value creation is the result of an interaction between beneficiaries, other stakeholders (enterprises, institutional actors, service providers) and other resources (objects, technologies, services) (Vargo & Lusch, 2004; Vargo & Lusch, 2008). Value creation happens in the local context of the beneficiary, i.e. in the logical and geographical niche in which s/he operates. Beneficiaries are the centre of the value co-creation process and their design action is based on their own experience, knowledge, problem solving capabilities. However, the interaction in this moment can be facilitated by more specific design abilities, to create interfaces, control systems, engaging rules (such as games), competition or cooperation mechanisms or creativity tools, such as cards to support the dialogue between citizens and experts (Cottam & Leadbeater, 2004a). The attention of several design studies has been focused on the process of *infrastructuring*, that is the process that supports, triggers or empowers customer creativity or creates the *agonistic* ground for interaction (Björgvinsson et al., 2010; Manzini & Staszowski, 2013). In some instances, the effect this kind of design intervention can have is to provoke *avalanche* changes around specific innovation areas. Such avalanche consists of multidimensional and multidirectional innovation flows, that increase the innovation tension in a niche, with the expectation that such tension will find preferred paths to create more pressure over the regime structures or even on the sociotechnical landscape (Figure 2).

Figure 2 design in the value creation context and pressure on sociotechnical regimes and landscapes

It is however important to point out that design may also have a role of creating frameworks that address such flows towards preferred paths, as exemplified by Manzini and Rizzo (2011). The *Design of The Time* (DoTT07) program, for instance, was a program that enhanced a number of innovation initiatives in a northern England region. Such initiatives were touching different dimensions (from school reform to sustainability, from local food production to health issues) (Thackara, 2007). The framework program is not yet an organized infrastructure, but rather a way to align a number of initiatives to scenarios about desirable landscape changes (framework programs will be analysed later in this paper).

Purposeful action at the niche level can also aim at aggregating resources or actors (and therefore relevant knowledge) around local niches, thus creating proof of concepts for possible reproduction of local innovation in further niches or possibly to scale up innovation created in local communities. This was the case of some EU-funded project, such as Life 2.0 and My Neighborhood, which created innovation in a small network of actors, but also highlighted skills and competences that would consolidate a reproducible ecosystem (Morelli, 2015).

More generally, the organization and integration of resources at the niche level corresponds to the activity of designing a single instance of a service - a local fast food concept, a car pooling group or a solidarity purchasing group - where any innovative element is organized in a way that makes business, social and cultural sense. Even some experiments of migrants' integration in local communities, where any available resource, from empty apartments to migration regulations are organized to create meaningful reconfiguration of a local community, may represent an example of organized resource integration (Elia, 2013). It is worth noticing that the purposeful action at this level does not imply the intervention of an expert designer, as in the case of migrant integration in Riace, Italy, promoted by the major of the city (Elia, 2013) or the initiative of Social Streets invented by a citizen living in Bologna (Ecchia & Maria, 2016)[2]. The design skills involved in the action at this level concern problem solving, conflict management, prototyping and visualisation of meaningful opportunities. Although sometimes complex, those skills are very close to the natural capability to organize change and to integrate the available resources.

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[2] The mayor of Riace re-vived a depopulated town in the South of Italy by opening empty apartments to migrant families, who created new activities and new needs for schools and civic infrastructure. The social street movement was initiated by a citizen in Bologna who used a Facebook group to create new physical interaction with his neighbours

The institutional arrangements, that support the value creation system at the regime level are service organizations (e.g. fast food chains, franchising systems), public administrations (taxation systems, municipalservices, healthcare systems), or interaction platforms (created by private initiatives or cooperative movements, such as social networks, mutual help platforms, or share-based transport or residential solutions). Those arrangements organize the value creation ecosystem, by specifying rules of engagement, interaction modalities, actors' motivation, business purposes and motivation systems. This is typically the activity of service design. It concerns the visualization and organization of service interaction in a coherent architecture, the visualization of interaction mechanisms, motivations, business opportunities and social ecosystems. These competences are more specific of expert designers, because they require the capability to recognize value and embed it into the structure of the institutional arrangement, the capability of linking each element of detailed interaction to the systemic whole, and the capability to figure out, and possibly visualize scenarios of possible use of services or deployment of resources (Conley, 2004). New competences are recently being highlighted, in relation to the construction of service platforms, which represent a substantial transition in the concept of service organization, in which the traditional roles of producer/consumer is declining, in favour of a complex interaction system, based on value integration for mutual purpose, information exchange and filtering, relationship management, accessibility and redefinition of new exchange currencies (Choudary, 2015).

Design in landscapes

As mentioned in a previous section, the purposeful intervention at the landscape level does not produce direct changes in the landscape, but can actually trigger change processes. This is the logical level of institutions, which facilitate and regulate value creation by representing shared systems of values, social, cultural and political premises. Innovation in institutions depends on the aggregation of a number of factors, including, but not limited to human action. Design action is therefore unlikely to produce direct and controllable institutional changes. Nevertheless, several examples are evident, of purposeful social constructions aimed at influencing this level. This is the case of healthcare reforms, the Australia tax reform (Terrey, 2012), the construction of the American electricity system (Bijker, 1995), or the psychiatric reform in Italy (Manzini, 2015). The role of design at this level is still being discussed. What are the most successful strategies to amplify the impact of design action on institutions? Can we recognize more effective methods or tools to influence this level? What are the interactions between policy instruments (I.e. the institutional arrangements that actualize values and principles) and institutions? Are there tools to align design actions to institutional change, in order to link operational design aspects, even at the niche level with *desired* directions for institutional evolution?

Summarising design skills at different logical levels

The previous sections identify different levels for design action and some specific skills that lead to change in each of them. Table 1 synthesizes such skills, from everyday problem solving (at the bottom of the table) to major landscape changes.

Everyday problem solving refers to everybody's attitude to solve recursive or trivial problems - like driving a car, cooking, going to work - which usually do not represent any particular challenges to individual problem solving capability. This routinized type of behaviour has been described and studied as *practice*. Practices represent behaviors that depends on the interconnectedness of contextual elements, such as "things" and their use, background knowledge, know-how and emotional states. (Reckwitz, 2002, pp. 49-50). Practices are constantly repeating sequences of actions, although they may tolerate changes which may exercise higher or lower pressure on the practice framework.

Designing (i.e. generating purposeful change) at the **niche** level require different capabilities to interact with other actors or to organize or *infrastructure* such interaction, as for the organization of a web page or a service activity. Building upon Conley's definitions (Conley, 2004) the design capabilities required at this level concern:

- **Contextualization skills,** i.e. the ability to identify and respond to relationships between a solution and its context.
- **Experiential control,** i.e. the ability to use form to embody ideas and communicate their value and
- **Modeling skills,** i.e. the ability to model and visualize solutions before all the information is available (as in prototypes).

The activity of design at this level may use tools, such as visualization (Journeys, storyboards, dramas), analytical tools (personas, experience-, context- or technical- analysis) and models (such as prototypes, or role playing). Such tools describe the change that is intended to propose, simulate and experiment on such change and make sure that all the stakeholders in the value co-creation context be able to figure out and interpret their role in the perspective change. The literature about such tools and their use in design disciplines has been widely studied, especially in the disciplinary areas of service design, interaction design and industrial design. A number of projects, in the previous decade (Meroni, 2007; Parker & Heapy, 2006; Thackara, 2007) paved the way to the construction of a rich framework of competencies and skills. It is also worth mentioning the influence of schools and academic courses on service design, interaction design and more recently on social innovation in defining strategies and tools for design action at this level.

Changes at the **regime** level consists in designing and organizing services and platforms, the design skills at this level concern:

- **Architecture building skills,** i.e. the ability to add or maintain value as elements are integrated into a whole.
- **Vision skills,** i.e. the ability to recognize a broad range of potential in a given problem statement and
- **Open Problem solving skills,** i.e. an approach to problem solving that involves the creation and evaluation of multiple alternatives.

The activity of design at this level may use tools that help recognizing the element of a value co-creation ecosystem (such as stakeholders' maps, business model canvasses), and organizing complex interactions (such as blueprints, system maps, platform canvasses). Those skills are consistent with a vision of design as part of a production process, thus using the contiguity with management and marketing studies to borrow methods, tools and problem solving strategies. At the same time the skills related to this logical level aim at generating structured architectures and visions that can define subdivision of work (stakeholders' maps, motivation matrix) codification of knowledge (blueprinting) and opportunities for economy of scale (system maps) (Morelli, 2009). While the competences at the niche level may also refer to existing social practice or personal experience, this level obviously requires *expert* competences. Like the competences at the niche level however, the design competences at this level are quite well known and familiar to the design discipline, also because of the growing relevance of the design profession in new areas, such as service design and innovation.

Finally, the design skills related to changes at the **landscape** level concern the ability to influence and direct change in governance - in particular in policies - and in the principles and values that are eventually expressed into institutions. The design capabilities to impact on this level are:

- **Modeling skills,** i.e. the ability to model and visualize solutions before all the information is available
- **Intra-level design ability,** i.e. the ability to work at varying levels of abstraction.

Unlike the previous levels, the role of design in supporting landscape changes has not been systematically studied in the design discipline. This is probably due to the infrequent involvement of designers in governance and policy making bodies. The debate on design for policies has been quite active in the last decade, and the blossoming of government innovation labs connected to public administration and policy design[3] has highlighted the relevance of this issue. The debate however, has been limited to the role of design in delivering concrete results, rather than to the alignment of such results – and the strategies to achieve them – to the ongoing or desirable cultural, social or policy related horizon.

The next section will therefore consider some relevant contributions for a more systematic analysis of design approaches and tools to support purposeful changes of the sociotechnical landscape

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[3] On this matter, it is worth mentioning NESTA, in UK; MindLab and Innovationshuset in Denmark (both closed now); la 27me Région in France, Public Polcy Lab in New York, Helsinki Design Lab and the Design Policy Lab (at Politecnico di Milano), also recent projects, such as Design for Europe (designforeurope.eu/) and Designscapes (designscapes.eu) are contributing to this debate.

Table 1 Design skills and their relevance at the different logical levels. The value creation facilitators are the resources (people, technologies, organizational forms) that support value creation. The last column also includes some of the common tools used in relation to the various capabilities

	Resource integrators	Value creation facilitators	Example	Design Skills needed
Value creation in Sociotecnical Landscapes	Principles/values Governance (Policies)	Institutions	• Long-medium term Sustainability plans • Healthcare reforms • Tax reforms (Terrey, 2012) • Policy labs • Urban Health (Geels 2010) • Edison's electricity system (Bijker 1995) • Psychiatric reform (Manzini 2015) • Gas stove systems (Shwartz Cowan 1987) • DoTT 07 (Manzini-Rizzo 2011)	**Modeling skills** **Intra-level design ability** • Framework design programs • Design orienting scenarios • Theory of Change
Value creation at regime level	Services, service platforms Policy instruments	Service organizations Public administration	• Taxation services, Healthcare services, Fast food chains • Franchising • City Labs	**Architecture-building skills.** **Vision skills.** • System mapping tools • Alignment tools (to align services to policies or corporate values) • Business modelling
			Cooperative platforms Commercial platform (like AirBnB, Uber, Facebook)	**Architecture-building skills.** **Open problem solving skills** Platform building, HCI, Business modelling canvas
Value creation in niche contexts	Local Organization	Local service providers, expert designer, citizens	Solidarity purchasing groups, urban gardening groups	**Contextualization skills** **Architecture-building skills** • System tools • blueprint • system maps • business modelling
	Local Interaction	interaction structure	Mobile/web application, interaction cards, games.	**Modeling skills** **Experiential control** • Service journey/touchpoints. • User-driven methods
		Social practice	Restaurant	Professional experience
Everyday problem solving			Driving a car	Personal problem solving strategies

Aligning design at the three levels

The focus of the early experiments on design in public administration (Cottam & Leadbeater, 2004a, 2004b; Leadbeater & Cottam, 2008) highlighted the need to focus on citizens and enhancing their participation, thus proposing strategies for social innovation and practical tools (e.g. card games, prototypes) with the direct involvement of citizens in projects that were mostly developed at the niche level (Murray et al., 2010; Thackara, 2007). The need to develop design capability and strategies for policy change was more explicitly framed by the *Design for Europe* project (VV.AA, 2013). The focus of the contribution on this matter, however, has often been on the *policy delivery* process, that means on the process of developing policy instruments to solve concrete and specific cases, or to create proofs of concept (again, at the niche level), or to reframe the administrative structure of specific services (e.g. healthcare or taxation services) focusing on citizens' need, rather than organizational efficiency (Nesta, 2016).

The open question remains: can design – and designers - have a role in the process of change that concern the larger frameworks of principles and values that inspire policies and government action? This question can be translated into practical and operative terms: are there tools or strategies that allow designers to align interventions at niche or regime levels to larger actions that purposefully contribute to change the sociotechnical landscape?

Changes in sociotechnical landscapes, as mentioned above, are not directly deriving from purposeful action, but rather from small movements of the system of values and knowledge and social practices.

Manzini and Rizzo (2011) propose an alignment between small experiments at the local level and large sociotechnical changes. Such alignment would be possible through the definition of *framework design programs*. Those programs are generated as a result of different kinds of actions: they could be the result of scenarios proposed by design teams (as in DoTT07) or of negotiation among different stakeholders, or could be triggered by inspirational exhibitions or local living labs.

The intermediate steps between the small-scale experiments and the larger scenario changes is however seldom explored. Scale-out or scale-up processes[4] are supposed to support larger changes starting from local phenomena. Scalability happens according to different processes: *wild fire diffusion* (the most common case of diffusion phenomena, such as the take-up of social media) or *diffusion by nodes* or by *circles* (Morelli, 2015), which is based on the reproduction of small scale value-creation ecosystems. Scalability and diffusion, however, describe the expansion of a small-scale phenomenon, but still do not provide indications on *purposeful value creation* at the level of socio-technical landscape. That means they give no insights on how change can be addressed towards desirable landscape configurations.

Scenarios are a frequently used approach to the definition of large and long term changes, because they create the ground to generate strategic insights to align present actions to future desirable sociotechnical landscapes. This approach has been particularly relevant in studies on sustainability, where *backcasting* was used to imagine and select possible future scenarios and project them back into the present. (Holmberg, 1998).

Working with scenarios has always been implicitly or explicitly part of design activity. "Scenarios are images of possible, probable, or preferable futures or futures to be avoided, and sometimes comprise the steps to achieve them"(Jonas, 2001, p. 76). The organization of design work on the basis of scenarios implies a work of analysis, projection and synthesis (Ibid), which in operational terms has inspired Manzini et al. (2009), when proposing *design orienting scenarios,* a tool to align a framework of desired values.

- The analytical phase in this approach consists on mapping the current system of actors and negotiating and define a set of common goals and intentions at the systemic level.
- The scenarios (the projection phase) are built on the basis of hypotheses about the changes of the most critical factors (values, lifestyles, technological issues, social and ethical issues)
- The synthesis consists in plans for concrete solutions (services or infrastructure for local interaction), that use a kit of descriptive tools, including system maps, storyboard, and motivation matrix).

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[4] Scaling out has been defined as a horizontal process of scaling up (diffusion) whereas scaling up has been defined as a vertical process (institutionalisation)(Concilio et al., 2013; Morelli, 2015; Uvin et al., 2000)

A more systematic alignment between large scale changes and local/present design solutions can be facilitated by the use of *theory of change*.

A Theory of Change is a structured way to map a journey towards an expected change, starting from some assumptions about the causes of a present problem. It is therefore a useful planning tool, which shows the 'intervention logic' of a project, showing the actions that need to be taken to realize a desired goal or impact, the output, the outcomes and the expected changes deriving from the action. By figuring out this "causal pathway" between action and their impact, the theory of change proves to be a good evaluation tool, that can be used to align short term value creation with larger sociotechnical changes.

The Theory of Change can be used to boost innovation pathways in environments, such as urban contexts, where a number of small innovation ecosystems, composed by the alliance of different stakeholders, are proposing promising solutions to relevant or emerging urban issues. This is the case, for instance, of the Designscapes project[5] (Simeone et al., 2019)(Figure 3).
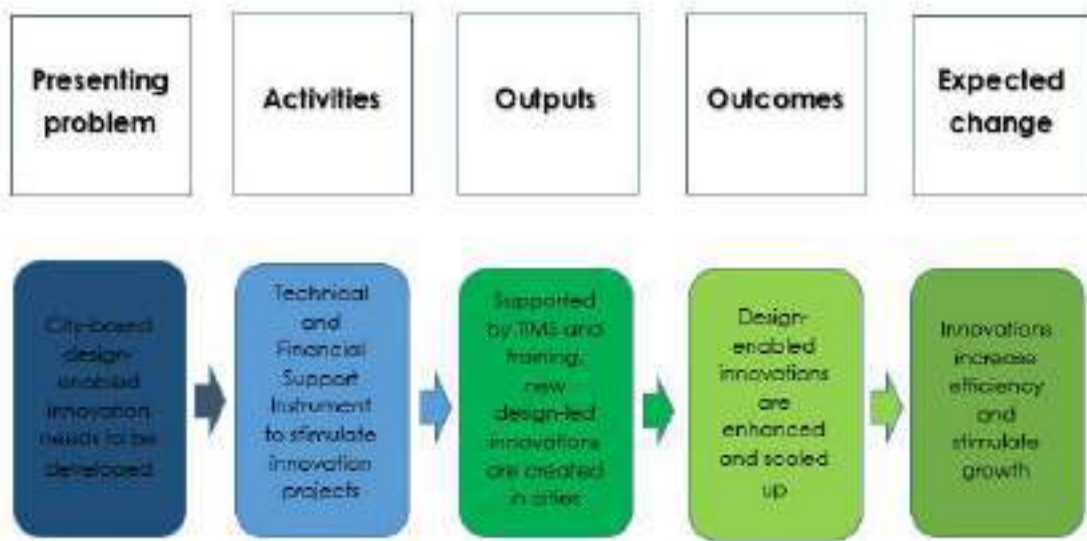
Figure 3 The Theory of Change, as used in the DESIGNSCAPES project. The the project aims at providing design-driven tools to leverage niche and regime oriented projects towards landscape changes (Source Designscapes project).

Conclusion

This paper starts from the assumption that the process of value creation depends on the human attitude to aggregate resources of different kinds (knowledge, services, technical infrastructure) to devise solutions that change the human beings' conditions. Design, intended as a purposeful change to an existing situation, is therefore a diffuse capability. The co-creation of new value, however, is also linked to a process of change, that can have different levels of definition, different structures and speed. When seen as a purposeful action, the ability of design consists of *infrastructuring* such change with different capabilities and different tools: capabilities and tools to support interaction and value co-creation at the niche level, to consolidate and codify innovation into solid regime structures and to align such changes to wider perspectives of transformations in the sociotechnical regime. The debate about value co-creation and the role of design has often focused on the niche level - how to engage people in design activities, how to design the interaction at the front desk, how to design experiences - or at the regime level – how to create service systems, how to manage change in organizations or administrations or in a production system. In recent years, new projects and studies are focusing the attention on the sociotechnical landscape and the contribution of design to this higher level, where design was hardly considered as a relevant attitude. This is the level in which design can contribute to policy making or to change the system of values, rules and regulations. Defining design as an attitude to generate purposeful change means investigating on how design capabilities can support and organize those

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[5] Designscapes is a EU-H2020 funded project that aims at promoting Design-Driven innovation in urban contexts. More information about the project is available at designscapes.eu.

changes and align change along different levels. From the perspective of expert designers this implies a better overview of the implications of design action on wider contexts and even on the most general system of values, believes, culture, policy and government-related issues. From the perspective of whoever is actively involved in innovation and change -managers, policy makers, organizations or single citizens - the framework proposed in this paper can help building up new value-creation capabilities.

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